Alliance SOURCE TESTING

TEST REPORT SUMMARY

Client Information / Test Location

Energy Transfer
Sunoco Partners Marketing and Terminals LP
Marcus Hook Industrial Complex
100 Green Street
Marcus Hook, PA 19061-4800

Source Information

Engine/Unit ID:	P-05-04A/113
Engine Make/Model:	Caterpillar 3516
Engine Serial Number:	27Z00734
Engine Type:	Compression Ignition
Engine Date of Reconstruct:	N/A
Engine Rating:	2,294 HP
Engine Load:	100.0%
Engine Hours:	9,554

Regulatory Applicability
40 CFR 63, Subpart ZZZZ
PaDEP TVOP 23-00119 issued on 8/25/2020
PFID: 757998

AST Project No.
2021-0418

Test Date
8/19/21

Test Results			Limits			Compliant/Non-compliant	
Pollutant	**Units**	**Average Results**	**PADEP TVOP 23-00119**	**Permit Condition**	**Subpart ZZZZ**	**PADEP TVOP 23-00119**	**Subpart ZZZZ**
Carbon Monoxide	ppmvd @ 15% O_2	6.5	23	§(D)(1)(004)	23	Compliant	Compliant
Nitrogen Oxides	ppmvd @ 15% O_2	931.7	--	--	--	--	--

** Performance testing was conducted while the engine was operating at the highest achievable load at current site conditions.*

Alliance
SOURCE TESTING

TEST REPORT SUMMARY

Client Information / Test Location

Energy Transfer
Sunoco Partners Marketing and Terminals LP
Marcus Hook Industrial Complex
100 Green Street
Marcus Hook, PA 19061-4800

Source Information

Engine/Unit ID:	P-05-04B/113
Engine Make/Model:	Caterpillar 3516
Engine Serial Number:	27Z00735
Engine Type:	Compression Ignition
Engine Date of Reconstruct:	N/A
Engine Rating:	2,294 HP
Engine Load:	100.0%
Engine Hours:	10,838

Regulatory Applicability
40 CFR 63, Subpart ZZZZ
PaDEP TVOP 23-00119 issued on 8/25/2020
PFID: 757998

AST Project No.
2021-0418

Test Date
8/19/21

Test Results			Limits			Compliant/Non-compliant	
Pollutant	**Units**	**Average Results**	**PADEP TVOP 23-00119**	**Permit Condition**	**Subpart ZZZZ**	**PADEP TVOP 23-00119**	**Subpart ZZZZ**
Carbon Monoxide	ppmvd @ 15% O_2	10.1	23	§(D)(1)(004)	23	Compliant	Compliant
Nitrogen Oxides	ppmvd @ 15% O_2	786.7	--	--	--	--	--

** Performance testing was conducted while the engine was operating at the highest achievable load at current site conditions.*

Alliance
SOURCE TESTING

TEST REPORT SUMMARY

Client Information / Test Location

Energy Transfer
Sunoco Partners Marketing and Terminals LP
Marcus Hook Industrial Complex
100 Green Street
Marcus Hook, PA 19061-4800

Source Information

Engine/Unit ID:	P-05-06A/113
Engine Make/Model:	Caterpillar 3508
Engine Serial Number:	95Y00875
Engine Type:	Compression Ignition
Engine Date of Reconstruct:	N/A
Engine Rating:	1,184 HP
Engine Load:	100.0%
Engine Hours:	10,800

Regulatory Applicability
40 CFR 63, Subpart ZZZZ
PaDEP TVOP 23-00119 issued on 8/25/2020
PFID: 757998

AST Project No.
2021-0418

Test Date
8/19/21

Test Results			Limits			Compliant/Non-compliant	
Pollutant	**Units**	**Average Results**	**PADEP TVOP 23-00119**	**Permit Condition**	**Subpart ZZZZ**	**PADEP TVOP 23-00119**	**Subpart ZZZZ**
Carbon Monoxide	ppmvd @ 15% O_2	3.9	23	§(D)(1)(004)	23	Compliant	Compliant
Nitrogen Oxides	ppmvd @ 15% O_2	613.2	--	--	--	--	--

** Performance testing was conducted while the engine was operating at the highest achievable load at current site conditions.*

Alliance
SOURCE TESTING

TEST REPORT SUMMARY

Client Information / Test Location

Energy Transfer
Sunoco Partners Marketing and Terminals LP
Marcus Hook Industrial Complex
100 Green Street
Marcus Hook, PA 19061-4800

Source Information

Engine/Unit ID:	P-05-06B/113
Engine Make/Model:	Caterpillar 3508
Engine Serial Number:	95Y00876
Engine Type:	Compression Ignition
Engine Date of Reconstruct:	N/A
Engine Rating:	1,184 HP
Engine Load:	100.0%
Engine Hours:	6,497

Regulatory Applicability
40 CFR 63, Subpart ZZZZ
PaDEP TVOP 23-00119 issued on 8/25/2020
PFID: 757998

AST Project No.
2021-0418

Test Date
8/18/21

Test Results			Limits			Compliant/Non-compliant	
Pollutant	**Units**	**Average Results**	**PADEP TVOP 23-00119**	**Permit Condition**	**Subpart ZZZZ**	**PADEP TVOP 23-00119**	**Subpart ZZZZ**
Carbon Monoxide	ppmvd @ 15% O_2	5.3	23	§(D)(1)(004)	23	Compliant	Compliant
Nitrogen Oxides	ppmvd @ 15% O_2	702.1	--	--	--	--	--

** Performance testing was conducted while the engine was operating at the highest achievable load at current site conditions.*

Engine Test Report

Energy Transfer
Sunoco Partners Marketing and
Terminals LP
100 Green Street
Marcus Hook, PA 19061-4800

Test Dates: August 18-19, 2021
Report Date: September 2, 2021

AST Project No. 2021-0418

Prepared By
Alliance Source Testing, LLC
24 Hagerty Blvd, Suite 13
West Chester, PA 19382

Regulatory Information

Permit No.	PaDEP Permit No. TVOP 23-00119
Regulatory Citation	40 CFR 63, Subpart ZZZZ

Engine Make/Model	*Source ID*	*S/N's*	*Target Parameters*
Caterpillar Engine 3516	P-05-04A	27Z00734	NOx & CO
Caterpillar Engine 3516	P-05-04B	27Z00735	NOx & CO
Caterpillar Engine 3508	P-05-06A	95Y00875	NOx & CO
Caterpillar Engine 3508	P-05-06B	95Y00876	NOx & CO

Contact Information

Test Location

Energy Transfer
Sunoco Partners Marketing and Terminals LP
100 Green Street
Marcus Hook, PA 19061-4800

Facility Contact
Kevin Smith
kevin.smith2@energytransfer.com
(610) 859-1279

Test Company

Alliance Source Testing, LLC
24 Hagerty Blvd, Suite 13
West Chester, PA 19382

Project Manager / Field Team Leader
Josh Carr
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QA/QC Manager
Heather Morgan
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(256) 260-3972

Report Coordinator
Nikolai Softcheck
nikolai.softcheck@stacktest.com
(724) 557-5642

Analytical Laboratory

Not Applicable

Alliance Source Testing, LLC (AST) has completed the source testing as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and AST is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or test program notes are detailed in the relevant sections on the test report.

This report is only considered valid once an authorized representative of AST has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

9/7/21

Josh Carr, QSTI
Project Manager / Field Team Leader
Alliance Source Testing, LLC

Date

CERTIFICATION OF DATA ACCURACY AND COMPLIANCE STATUS

I, the undersigned, hereby certify that, the finding(s) of the test(s) conducted on 8/19/21, presented in this report,show that Units P-05-04A, P-05-04B, P-05-06A & P-05-06B at the facility, Energy Transfer - Sunoco Partners Marketing and Terminals LP are in compliance ____X____, or is not in compliance _____, with the facility's PaDEP Permit No. TVOP 23-00119 and 40 CFR 63, Subpart ZZZZ.

Kevin Smith

9/8/2021

Kevin Smith
Environmental Specialist
Energy Transfer

Date

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

Introduction

1.0 Introduction

Alliance Source Testing, LLC (AST) was retained by Energy Transfer (ET) to conduct compliance testing at the Sunoco Partners Marketing and Terminals LP (SPMT) Marcus Hook Industrial Complex in Marcus Hook, Pennsylvania. The station operates under Pennsylvania Department of Environmental Protection (PaDEP) Permit No. TVOP 23-00119. Testing was conducted on four (4) diesel engine pumps to demonstrate compliance with emission limits detailed in 40 CFR 63, Subpart ZZZZ and the facility's PaDEP Title V air permit.

Compliance testing was conducted to determine the concentrations of nitrogen oxides (NOx) and carbon monoxide (CO). Testing consisted of three (3) 15-minute test runs for each source. Test run duration modification was approved by the EPA (R3) on May 10, 2021. Performance testing was conducted while the units were operating at the highest achievable load at current site conditions. The Test Report Summary (TRS) provides the results from the compliance testing, including the three (3) run average, with comparisons to the applicable limits. Any difference between the summary results listed in the TRS and the detailed results contained in the appendices is due to rounding for presentation.

1.1 Facility and Process Description

Sunoco owns and operates a natural gas liquids and crude oil storage and transfer terminal at its Marcus Hook Industrial Complex located in Marcus Hook, Pennsylvania. The Marcus Hook Industrial Complex operates six (6) diesel engines (Source ID 113) (three pair of engines) to power six water pumps utilized to remove surface water from the Marcus Hook facility roadways to allow access to pipe racks and cable trays during a significant rainfall event. As the amount of water subsides the pumps are shut-down as the engines are no longer required to drain the area. It should be noted that maximum loads for the engines are only achieved during or immediately after these events when the sumps of full of water.

The P-05-2A and P-05-2B engines are identical Caterpillar Model 3512 sixteen-cylinder, compression ignition engines. The units are fired with No. 2 fuel oil and have a maximum rated horsepower of 1,745 HP at 1,800 RPM. Each engine is directly coupled to a facility water pump with a maximum rated pump capacity of 23,500 gallons per minute (gpm). Each engine is equipped with an oxidation catalyst for CO control.

The P-05-4A and P-05-4B engines are identical Caterpillar Model 3516 sixteen -cylinder, compression ignition engines. The units are fired with No. 2 fuel oil and have a maximum rated horsepower of 2,294 HP at 1,800 RPM. Each engine is directly coupled to a facility water pump with a maximum rated pump capacity of 32,000 gpm. Each engine is equipped with an oxidation catalyst for CO control.

The P-05-6A and P-05-6B engines are identical Caterpillar 3508 sixteen-cylinder, compression ignition engines. The units are fired with No. 2 fuel oil and have a maximum rated horsepower of 1,184 HP at 1,800 RPM. Each engine is directly coupled to a facility water pump with a maximum rated pump capacity of 42,650 gpm. Each engine is equipped with an oxidation catalyst for CO control.

1.2 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1
Project Team

AST Personnel	Josh Carr

1.3 Test Protocol & Notification

Testing was conducted in accordance with the test protocol and notification submitted to PADEP by SPMT and EPA approval letter dated May 10, 2021.

1.4 Test Program Notes

Testing for Units-MP05-02A & MP05-02B was postponed and will be tested on a future mobilization.

1.5 Method Deviations

There deviations from U.S. EPA Reference Testing Methods during the onsite testing. However, SPMT received EPA approval for an alternate testing procedure which allowed for 15 minutes on May 10, 2021.

Testing Methodology

2.0 Methodology

The testing program was conducted in accordance with the test methods listed in Table 2-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix C.

Table 2-1
Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Oxygen	3A	Instrumental Analysis
Nitrogen Oxides	7E	Instrumental Analysis
Carbon Monoxide	10	Instrumental Analysis
Gas Dilution System Certification	205	--

2.1 U.S. EPA Reference Test Method 3A – Oxygen

The oxygen was conducted in accordance with U.S. EPA Reference Test Method 3A. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless steel probe, heated Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system was a non-contact condenser used to remove moisture from the stack gas. Otherwise, a heated Teflon sample line was used. The quality control measures are described in Section 2.5.

2.2 U.S. EPA Reference Test Method 7E – Nitrogen Oxides

The nitrogen oxides (NO_x) testing was conducted in accordance with U.S. EP A Reference Test Method 7E. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless steel probe, heated Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system was a non-contact condenser used to remove moisture from the stack gas. The quality control measures are described in Section 2.5.

2.3 U.S. EPA Reference Test Method 10 – Carbon Monoxide

The carbon monoxide (CO) testing was conducted in accordance with U.S. EPA Reference Test Method 10. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless steel probe, heated Teflon sample line(s), gas conditioning system, and the identified gas analyzer. The gas conditioning system was a non-contact condenser used to remove moisture from the gas. Otherwise, a heated Teflon sample line was used. The quality control measures are described in Section 2.5.

2.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check was conducted in accordance with U.S. EPA Reference Method 205. Multiple dilution rates and total gas flow rates were utilized to force the dilution system to perform two dilutions on each mass flow controller. The diluted calibration gases were sent directly to the analyzer, and the analyzer response recorded in an electronic field data sheet. The analyzer response agreed within 2% of the actual diluted gas concentration. A second Protocol 1 calibration gas, with a cylinder concentration within 10% of one of the gas divider settings described above, was introduced directly to the analyzer, and the analyzer response recorded in an electronic field data sheet. The cylinder concentration and the analyzer response agreed within 2%. These steps

were repeated three (3) times. Copies of the Method 205 data can be found in the Quality Assurance/Quality Control Appendix.

2.5 Quality Assurance/Quality Control – U.S. EPA Reference Methods 3A, 7E and 10

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Low Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the Mid Level gas. Next, High Level gas was introduced directly to the analyzer, and the response recorded when it was stable. All values were within 2.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

High or Mid Level gas (whichever was closer to the stack gas concentration) was introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it reached a stable value, and this value was recorded. Next, Low Level gas was introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5 ppm (whichever was less restrictive) was recorded. If the Low Level gas was zero gas, the response was 0.5 ppm or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference

High or Mid Level gas (whichever was closer to the stack gas concentration) was introduced at the probe. After the analyzer response was stable, the value was recorded. Next, Low Level gas was introduced at the probe, and the analyzer value recorded once it reached a stable response. The System Bias was within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference or the data was invalidated and the Calibration Error Test and System Bias were repeated.

Drift between pre- and post-run System Bias was within 0.5 ppmv absolute difference or the Calibration Error Test and System Bias were repeated.

An NO_2 – NO converter check was performed on the analyzer prior to initiating testing. An approximately 50 ppm nitrogen dioxide cylinder gas was introduced directly to the NOx analyzer and the instrument response was recorded in an electronic data sheet. The instrument response was within +/- 10 percent of the cylinder concentration.

A Data Acquisition System with battery backup was used to record the instrument response in one (1) minute averages. The data was continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data was also saved to the AST server. All data was reviewed by the Field Team Leader before leaving the facility. Once arriving at AST's office, all written and electronic data was relinquished to the report coordinator and then a final review was performed by the Project Manager.

Appendix A

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418
Run No. /Method Run 1 / Method 7E

NOx - Outlet Concentration (C_{NOx}), ppmvd

$$C_{NOx} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	1810.3	= average analyzer value during test, ppmvd
C_o	0.7	= average of pretest & posttest zero responses, ppmvd
C_{MA}	1200.0	= actual concentration of calibration gas, ppmvd
C_M	1228.8	= average of pretest & posttest calibration responses, ppmvd
C_{NOx}	1768.2	= NOx Concentration, ppmvd

NOx - Outlet Concentration (C_{NOxc15}), ppmvd @ 15% O_2

$$C_{NOxc15} = C_{NOx} \times \left(\frac{20.9 - 15}{20.9 - O_2} \right)$$

where,

C_{NOx}	1768.2	= NOx - Outlet Concentration, ppmvd
C_{O_2}	9.8	= oxygen concentration, %
C_{NOxc15}	943.2	= ppmvd @15% O_2

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418
Run No. /Method Run 1 / Method 10

CO - Outlet Concentration (C_{CO}), ppmvd

$$C_{CO} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	13.7	= average analyzer value during test, ppmvd
C_o	0.6	= average of pretest & posttest zero responses, ppmvd
C_{MA}	12.0	= actual concentration of calibration gas, ppmvd
C_M	12.2	= average of pretest & posttest calibration responses, ppmvd
C_{CO}	13.6	= CO Concentration, ppmvd

CO - Outlet Concentration (C_{COc15}), ppmvd @ 15% O_2

$$C_{COc15} = C_{CO} \times \left(\frac{20.9 - 15}{20.9 - O_2} \right)$$

where,

C_{CO}	13.6	= CO - Outlet Concentration, ppmvd
C_{O_2}	9.8	= oxygen concentration, %
C_{COc15}	7.3	= ppmvd @15% O_2

Appendix B

Location Energy Transfer Partners - LNG Plant
Source P-05-04A/113
Project No. 2021-0418

Run Number		Run 1	Run 2	Run 3	Average
Date		8/19/21	8/19/21	8/19/21	--
Start Time		9:35	10:04	10:32	--
Stop Time		9:50	10:19	10:47	--
Engine Data					
Engine Manufacturer			Caterpillar		
Engine Model			3516		
Engine Serial Number			27Z00734		
Engine Type			Compression Ignition		
Engine Hour Meter Reading	EMR		9,554		
Pre Catalyst Temperature, °F	PreT	869	930	924	908
Catalyst Differential Pressure, in WC	ΔP	6	5	4	5
Maximum Engine Brake Work, HP	MaxEBW	2,294	2,294	2,294	2,294
Fuel Heating Value, Btu/scf	F_{HV}	1,040	1,040	1,040	1,040
Fuel Factor (O2 dry), dscf/MMBtu	Fd	8,710	8,710	8,710	8,710
Ambient Temperature	T_{Amb}	81	81	81	81
Relative Humidity, %	RH	74	74	74	74
Barometric Pressure, in. Hg	Pb	29.61	29.61	29.61	29.61
Brake Specific Fuel Consumption, Btu/HP-hr	BSFC	8,373	8,373	8,373	8,373
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	9.8	9.9	9.9	9.9
CO_2 Concentration, % dry	C_{CO_2}	8.3	8.2	8.2	8.2
CO Concentration, ppmvd	C_{CO}	13.6	12.8	9.8	12.1
CO Concentration, ppmvd @ 15 % O_2	C_{COc15}	7.3	6.9	5.3	6.5
NOx Concentration, ppmvd	C_{NOx}	1768.2	1719.3	1726.7	1738.0
NOx Concentration, ppmvd @ 15 % O_2	C_{NOxc15}	943.2	921.8	930.2	931.7

Alliance SOURCE TESTING

Run 1 - CEMS Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418
Date: 8/19/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
9:35	9.77	8.33	13.35	1,769.23
9:36	9.80	8.29	14.02	1,776.63
9:37	9.84	8.26	13.56	1,784.87
9:38	9.86	8.25	14.63	1,793.27
9:39	9.89	8.23	13.99	1,799.89
9:40	9.88	8.24	14.29	1,807.45
9:41	9.91	8.19	13.91	1,811.31
9:42	9.92	8.19	12.30	1,819.02
9:43	9.91	8.20	14.10	1,822.35
9:44	9.92	8.20	12.46	1,823.44
9:45	9.94	8.19	12.78	1,828.91
9:46	9.96	8.18	13.61	1,835.39
9:47	9.94	8.17	13.37	1,813.18
9:48	9.94	8.16	16.91	1,826.62
9:49	9.94	8.17	12.60	1,842.93

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	9.9	8.2	13.7	1,810.3
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.06	0.10	0.58	0.85
Posttest System Zero Response	0.10	0.07	0.56	0.56
Average Zero Response (Co)	0.1	0.1	0.6	0.7
Pretest System Cal Response	10.05	9.93	12.07	1,232.61
Posttest System Cal Response	10.06	9.95	12.23	1,225.03
Average Cal Response (C_M)	10.1	9.9	12.2	1,228.8
Corrected Run Average (Corr)	9.8	8.3	13.6	1,768.2

Alliance SOURCE TESTING

Run 2 - CEMS Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418
Date: 8/19/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
10:04	9.92	8.20	12.21	1,758.54
10:05	9.93	8.19	13.10	1,765.04
10:06	9.92	8.19	13.02	1,771.01
10:07	9.96	8.19	13.62	1,772.45
10:08	9.99	8.16	13.47	1,770.84
10:09	9.99	8.14	13.34	1,769.29
10:10	9.98	8.16	13.67	1,767.87
10:11	9.97	8.16	13.82	1,760.16
10:12	9.97	8.16	13.35	1,762.35
10:13	9.97	8.17	12.78	1,768.92
10:14	9.96	8.17	11.79	1,768.69
10:15	9.97	8.17	13.64	1,771.71
10:16	9.94	8.18	12.98	1,775.06
10:17	9.94	8.16	12.04	1,758.84
10:18	9.93	8.19	11.87	1,769.30

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	10.0	8.2	13.0	1,767.3
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.10	0.07	0.56	0.56
Posttest System Zero Response	0.05	0.07	0.01	0.56
Average Zero Response (Co)	0.1	0.1	0.3	0.6
Pretest System Cal Response	10.06	9.95	12.23	1,225.03
Posttest System Cal Response	10.06	9.95	12.17	1,242.40
Average Cal Response (C_M)	10.1	10.0	12.2	1,233.7
Corrected Run Average (Corr)	9.9	8.2	12.8	1,719.3

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418
Date: 8/19/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
10:32	9.96	8.16	10.86	1,778.60
10:33	9.95	8.17	10.47	1,781.20
10:34	9.93	8.19	9.90	1,783.30
10:35	9.94	8.18	9.23	1,790.19
10:36	9.95	8.18	9.46	1,786.99
10:37	9.94	8.18	10.12	1,786.80
10:38	9.94	8.19	10.34	1,790.39
10:39	9.96	8.18	9.06	1,798.32
10:40	9.94	8.18	10.73	1,798.63
10:41	9.93	8.19	9.91	1,796.48
10:42	9.95	8.18	9.40	1,798.07
10:43	10.09	8.07	11.34	1,784.92
10:44	10.25	7.97	8.74	1,761.88
10:45	10.26	7.97	9.20	1,749.66
10:46	10.21	7.99	12.12	1,723.53

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	10.0	8.1	10.1	1,780.6
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.05	0.07	0.01	0.56
Posttest System Zero Response	0.10	0.07	0.02	0.63
Average Zero Response (Co)	0.1	0.1	0.0	0.6
Pretest System Cal Response	10.06	9.95	12.17	1,242.40
Posttest System Cal Response	10.07	9.96	12.38	1,232.94
Average Cal Response (C_M)	10.1	10.0	12.3	1,237.7
Corrected Run Average (Corr)	9.9	8.2	9.8	1,726.7

Location Energy Transfer Partners - LNG Plant
Source P-05-04B/113
Project No. 2021-0418

Run Number		Run 1	Run 2	Run 3	Average
Date		8/19/21	8/19/21	8/19/21	--
Start Time		11:17	12:55	13:37	--
Stop Time		11:32	13:10	13:52	--
Engine Data					
Engine Manufacturer			Caterpillar		
Engine Model			3516		
Engine Serial Number			27Z00735		
Engine Type			Compression Ignition		
Engine Hour Meter Reading	EMR		10,838		
Pre Catalyst Temperature, °F	PreT	884	840	953	892
Catalyst Differential Pressure, in WC	ΔP	2	2	2	2
Maximum Engine Brake Work, HP	MaxEBW	2,294	2,294	2,294	2,294
Fuel Heating Value, Btu/scf	F_{HV}	1,040	1,040	1,040	1,040
Fuel Factor (O2 dry), dscf/MMBtu	Fd	8,710	8,710	8,710	8,710
Ambient Temperature	T_{Amb}	81	81	81	81
Relative Humidity, %	RH	74	74	74	74
Barometric Pressure, in. Hg	Pb	29.61	29.61	29.61	29.61
Brake Specific Fuel Consumption, Btu/HP-hr	BSFC	8,373	8,373	8,373	8,373
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	8.8	8.7	8.8	8.8
CO_2 Concentration, % dry	C_{CO_2}	8.9	9.0	9.0	9.0
CO Concentration, ppmvd	C_{CO}	19.1	20.0	23.3	20.8
CO Concentration, ppmvd @ 15 % O_2	C_{COc15}	9.3	9.7	11.3	10.1
NOx Concentration, ppmvd	C_{NOx}	1592.4	1653.3	1612.2	1619.3
NOx Concentration, ppmvd @ 15 % O_2	C_{NOxc15}	776.7	800.5	783.0	786.7

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04B/113
Project No.: 2021-0418
Date: 8/19/21

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	CO - Outlet ppmvd Valid	NOx - Outlet ppmvd Valid
11:17	8.75	8.97	17.52	1,614.91
11:18	8.79	8.96	18.35	1,618.67
11:19	8.84	8.93	18.65	1,617.00
11:20	8.85	8.92	18.09	1,618.52
11:21	8.83	8.93	17.47	1,621.84
11:22	8.82	8.93	19.99	1,629.25
11:23	8.88	8.89	20.92	1,635.29
11:24	8.87	8.89	20.20	1,637.53
11:25	8.89	8.89	20.42	1,637.65
11:26	8.91	8.88	19.35	1,644.44
11:27	8.92	8.86	20.44	1,643.50
11:28	8.92	8.86	20.71	1,642.44
11:29	8.93	8.85	20.57	1,637.06
11:30	8.91	8.87	19.75	1,629.64
11:31	8.93	8.85	21.20	1,630.08

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	8.9	8.9	19.6	1,630.5
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.10	0.07	0.02	0.63
Posttest System Zero Response	0.04	0.05	0.12	0.56
Average Zero Response (Co)	0.1	0.1	0.1	0.6
Pretest System Cal Response	10.07	9.96	12.38	1,232.94
Posttest System Cal Response	10.06	9.97	12.32	1,224.88
Average Cal Response (C_M)	10.1	10.0	12.4	1,228.9
Corrected Run Average (Corr)	8.8	8.9	19.1	1,592.4

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04B/113
Project No.: 2021-0418
Date: 8/19/21

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	CO - Outlet ppmvd Valid	NOx - Outlet ppmvd Valid
12:55	8.71	9.01	19.50	1,680.83
12:56	8.79	8.95	19.83	1,682.02
12:57	8.81	8.94	19.04	1,688.12
12:58	8.81	8.92	19.01	1,700.08
12:59	8.77	8.95	20.77	1,708.29
13:00	8.79	8.94	21.55	1,718.15
13:01	8.81	8.93	20.25	1,714.54
13:02	8.83	8.92	20.31	1,716.79
13:03	8.68	8.92	19.27	1,670.90
13:04	8.69	9.02	22.41	1,633.42
13:05	8.74	8.99	21.61	1,636.28
13:06	8.75	8.98	21.35	1,633.64
13:07	8.76	8.95	18.34	1,635.28
13:08	8.75	8.94	20.72	1,646.71
13:09	8.81	8.93	18.70	1,655.94

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	8.8	9.0	20.2	1,674.7
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.04	0.05	0.12	0.56
Posttest System Zero Response	0.02	0.06	0.03	0.61
Average Zero Response (Co)	0.0	0.1	0.1	0.6
Pretest System Cal Response	10.06	9.97	12.32	1,224.88
Posttest System Cal Response	10.05	9.95	11.94	1,206.54
Average Cal Response (C_M)	10.1	10.0	12.1	1,215.7
Corrected Run Average (Corr)	8.7	9.0	20.0	1,653.3

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04B/113
Project No.: 2021-0418
Date: 8/19/21

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	CO - Outlet ppmvd Valid	NOx - Outlet ppmvd Valid
13:37	8.79	8.92	23.33	1,634.44
13:38	8.78	8.93	23.23	1,634.77
13:39	8.81	8.91	24.04	1,629.92
13:40	8.80	8.94	23.57	1,634.36
13:41	8.80	8.93	23.32	1,633.57
13:42	8.79	8.93	22.30	1,634.46
13:43	8.78	8.95	22.77	1,635.15
13:44	8.79	8.95	21.62	1,638.24
13:45	8.78	8.95	22.39	1,639.40
13:46	8.79	8.95	22.32	1,637.10
13:47	8.80	8.95	22.67	1,642.61
13:48	8.80	8.95	21.59	1,649.91
13:49	8.81	8.95	20.80	1,652.17
13:50	8.81	8.92	20.28	1,648.35
13:51	8.79	8.96	21.28	1,643.87

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	8.8	8.9	22.4	1,639.2
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.02	0.06	0.03	0.61
Posttest System Zero Response	0.04	0.07	0.44	0.57
Average Zero Response (Co)	0.0	0.1	0.2	0.6
Pretest System Cal Response	10.05	9.95	11.94	1,206.54
Posttest System Cal Response	10.04	9.94	11.28	1,233.96
Average Cal Response (C_M)	10.0	9.9	11.6	1,220.3
Corrected Run Average (Corr)	8.8	9.0	23.3	1,612.2

Location Energy Transfer Partners - LNG Plant
Source P-05-06A/113
Project No. 2021-0418

Run Number		Run 1	Run 2	Run 3	Average
Date		8/19/21	8/19/21	8/19/21	--
Start Time		7:56	8:26	8:59	--
Stop Time		8:11	8:41	9:14	--
Engine Data					
Engine Manufacturer			Caterpillar		
Engine Model			3508		
Engine Serial Number			95Y00875		
Engine Type			Compression Ignition		
Engine Hour Meter Reading	EMR		10,800		
Pre Catalyst Temperature, °F	PreT	813	826	829	823
Catalyst Differential Pressure, in WC	ΔP	2	1	1	2
Maximum Engine Brake Work, HP	MaxEBW	1,184	1,184	1,184	1,184
Fuel Heating Value, Btu/scf	F_{HV}	1,040	1,040	1,040	1,040
Fuel Factor (O2 dry), dscf/MMBtu	Fd	8,710	8,710	8,710	8,710
Ambient Temperature	T_{Amb}	81	81	81	81
Relative Humidity, %	RH	74	74	74	74
Barometric Pressure, in. Hg	Pb	29.61	29.61	29.61	29.61
Brake Specific Fuel Consumption, Btu/HP-hr	BSFC	9,468	9,468	9,468	9,468
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	10.7	10.6	10.6	10.6
CO_2 Concentration, % dry	C_{CO_2}	7.7	7.7	7.7	7.7
CO Concentration, ppmvd	C_{CO}	5.9	8.9	5.3	6.7
CO Concentration, ppmvd @ 15 % O_2	C_{COc15}	3.4	5.1	3.1	3.9
NOx Concentration, ppmvd	C_{NOx}	1175.3	1020.1	1005.1	1066.9
NOx Concentration, ppmvd @ 15 % O_2	C_{NOxc15}	678.0	585.6	576.0	613.2

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06A/113
Project No.: 2021-0418
Date: 8/19/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
7:56	10.65	7.73	6.16	1,197.10
7:57	10.67	7.74	5.17	1,199.95
7:58	10.69	7.72	5.43	1,206.12
7:59	10.73	7.70	7.26	1,198.43
8:00	10.73	7.69	6.43	1,201.26
8:01	10.74	7.69	6.14	1,201.01
8:02	10.85	7.60	5.68	1,189.82
8:03	10.87	7.59	5.87	1,184.29
8:04	10.84	7.61	5.54	1,193.66
8:05	10.84	7.62	6.61	1,193.89
8:06	10.83	7.62	6.15	1,201.77
8:07	10.81	7.64	6.78	1,200.35
8:08	10.82	7.63	6.39	1,198.79
8:09	10.81	7.63	6.66	1,200.21
8:10	10.79	7.64	5.41	1,206.01

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	10.8	7.7	6.1	1,198.2
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.10	0.05	0.49	0.34
Posttest System Zero Response	0.09	0.06	0.52	0.88
Average Zero Response (Co)	0.1	0.1	0.5	0.6
Pretest System Cal Response	10.11	9.94	11.92	1,230.94
Posttest System Cal Response	10.10	9.94	11.88	1,215.65
Average Cal Response (C_M)	10.1	9.9	11.9	1,223.3
Corrected Run Average (Corr)	10.7	7.7	5.9	1,175.3

Alliance SOURCE TESTING

Run 2 - CEMS Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06A/113
Project No.: 2021-0418
Date: 8/19/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
8:26	10.71	7.69	9.88	1,039.78
8:27	10.70	7.69	9.36	1,041.94
8:28	10.73	7.68	9.18	1,044.61
8:29	10.72	7.67	7.87	1,037.84
8:30	10.71	7.69	10.00	1,041.29
8:31	10.71	7.68	9.63	1,043.59
8:32	10.72	7.68	9.47	1,045.46
8:33	10.72	7.67	9.63	1,040.07
8:34	10.71	7.68	8.79	1,038.01
8:35	10.68	7.70	9.46	1,043.07
8:36	10.68	7.70	7.41	1,043.48
8:37	10.69	7.69	9.12	1,041.94
8:38	10.70	7.69	8.23	1,041.58
8:39	10.71	7.69	7.26	1,038.33
8:40	10.71	7.69	7.99	1,038.06

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	10.7	7.7	8.9	1,041.3
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.09	0.06	0.52	0.88
Posttest System Zero Response	0.11	0.08	0.52	0.73
Average Zero Response (Co)	0.1	0.1	0.5	0.8
Pretest System Cal Response	10.10	9.94	11.88	1,215.65
Posttest System Cal Response	10.07	9.94	11.69	1,233.94
Average Cal Response (C_M)	10.1	9.9	11.8	1,224.8
Corrected Run Average (Corr)	10.6	7.7	8.9	1,020.1

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06A/113
Project No.: 2021-0418
Date: 8/19/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
8:59	10.65	7.70	5.97	1,018.33
9:00	10.64	7.71	6.53	1,031.34
9:01	10.64	7.72	8.07	1,035.32
9:02	10.63	7.72	6.81	1,035.89
9:03	10.66	7.70	5.57	1,032.08
9:04	10.66	7.70	5.82	1,034.02
9:05	10.66	7.70	4.92	1,036.56
9:06	10.68	7.69	4.51	1,036.79
9:07	10.67	7.69	4.90	1,035.20
9:08	10.68	7.69	4.71	1,037.47
9:09	10.68	7.69	4.63	1,035.69
9:10	10.70	7.67	5.69	1,033.84
9:11	10.68	7.69	5.15	1,034.49
9:12	10.66	7.70	5.03	1,030.74
9:13	10.66	7.70	5.51	1,029.49

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	10.7	7.7	5.6	1,033.2
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.11	0.08	0.52	0.73
Posttest System Zero Response	0.06	0.10	0.58	0.85
Average Zero Response (Co)	0.1	0.1	0.6	0.8
Pretest System Cal Response	10.07	9.94	11.69	1,233.94
Posttest System Cal Response	10.05	9.93	12.07	1,232.61
Average Cal Response (C_M)	10.1	9.9	11.9	1,233.3
Corrected Run Average (Corr)	10.6	7.7	5.3	1,005.1

Location Energy Transfer Partners - LNG Plant
Source P-05-06B/113
Project No. 2021-0418

Run Number		Run 1	Run 2	Run 3	Average
Date		8/18/21	8/18/21	8/18/21	--
Start Time		15:37	16:09	16:42	--
Stop Time		15:52	16:24	16:57	--
Engine Data					
Engine Manufacturer			Caterpillar		
Engine Model			3508		
Engine Serial Number			95Y00876		
Engine Type			Compression Ignition		
Engine Hour Meter Reading	EMR		6,497		
Pre Catalyst Temperature, °F	PreT	936	946	957	946
Catalyst Differential Pressure, in WC	ΔP	2	2	2	2
Engine Speed, RPM	ES	1,524	1,524	1,524	1,524
Maximum Engine Brake Work, HP	MaxEBW	1,184	1,184	1,184	1,184
Fuel Heating Value, Btu/scf	F_{HV}	1,040	1,040	1,040	1,040
Fuel Factor (O2 dry), dscf/MMBtu	Fd	8,710	8,710	8,710	8,710
Ambient Temperature	T_{Amb}	87	87	87	87
Relative Humidity, %	RH	55	55	55	55
Barometric Pressure, in. Hg	Pb	30.04	30.04	30.04	30.04
Brake Specific Fuel Consumption, Btu/HP-hr	BSFC	9,468	9,468	9,468	9,468
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	9.0	8.9	8.7	8.9
CO_2 Concentration, % dry	C_{CO_2}	8.8	8.9	9.0	8.9
CO Concentration, ppmvd	C_{CO}	11.2	9.2	12.0	10.8
CO Concentration, ppmvd @ 15 % O_2	C_{COc15}	5.6	4.5	5.8	5.3
NOx Concentration, ppmvd	C_{NOx}	1399.6	1429.5	1458.2	1429.1
NOx Concentration, ppmvd @ 15 % O_2	C_{NOxc15}	695.2	703.5	707.7	702.1

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06B/113
Project No.: 2021-0418
Date: 8/18/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
15:37	9.24	8.68	11.96	1,423.01
15:38	9.25	8.67	12.01	1,429.10
15:39	9.27	8.67	11.28	1,426.42
15:40	9.27	8.66	12.72	1,432.61
15:41	9.26	8.68	11.39	1,432.15
15:42	9.25	8.69	11.56	1,433.97
15:43	9.23	8.69	11.89	1,423.25
15:44	9.13	8.75	11.84	1,444.04
15:45	9.05	8.82	13.05	1,438.53
15:46	9.04	8.88	11.98	1,432.20
15:47	9.00	8.90	11.59	1,433.34
15:48	8.96	8.92	10.79	1,442.58
15:49	8.95	8.93	12.14	1,445.58
15:50	9.00	8.91	11.28	1,442.96
15:51	9.01	8.89	10.86	1,442.08

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	9.1	8.8	11.8	1,434.8
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.15	0.01	0.01	0.23
Posttest System Zero Response	0.08	0.05	0.00	0.17
Average Zero Response (Co)	0.1	0.0	0.0	0.2
Pretest System Cal Response	10.14	9.96	12.77	1,237.43
Posttest System Cal Response	10.07	10.02	12.38	1,222.96
Average Cal Response (C_M)	10.1	10.0	12.6	1,230.2
Corrected Run Average (Corr)	9.0	8.8	11.2	1,399.6

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06B/113
Project No.: 2021-0418
Date: 8/18/21

Time	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Unit	% dry	% dry	ppmvd	ppmvd
Status	Valid	Valid	Valid	Valid
16:09	8.92	8.90	11.55	1,455.90
16:10	8.91	8.89	10.08	1,458.82
16:11	8.94	8.89	11.61	1,460.12
16:12	8.94	8.94	9.96	1,462.31
16:13	8.99	8.86	10.90	1,462.28
16:14	9.01	8.84	9.67	1,460.11
16:15	9.03	8.83	8.52	1,460.52
16:16	9.03	8.83	8.49	1,464.71
16:17	9.02	8.84	7.51	1,457.42
16:18	9.00	8.86	8.30	1,454.52
16:19	8.98	8.86	8.03	1,457.72
16:20	8.97	8.87	7.70	1,457.31
16:21	8.96	8.88	8.73	1,456.72
16:22	8.90	8.91	9.15	1,457.72
16:23	8.87	8.93	11.67	1,459.89

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	9.0	8.9	9.5	1,459.1
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.08	0.05	0.00	0.17
Posttest System Zero Response	0.09	0.07	0.00	0.52
Average Zero Response (Co)	0.1	0.1	0.0	0.3
Pretest System Cal Response	10.07	10.02	12.38	1,222.96
Posttest System Cal Response	10.03	10.02	12.32	1,226.79
Average Cal Response (C_M)	10.1	10.0	12.4	1,224.9
Corrected Run Average (Corr)	8.9	8.9	9.2	1,429.5

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06B/113
Project No.: 2021-0418
Date: 8/18/21

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	CO - Outlet ppmvd Valid	NOx - Outlet ppmvd Valid
16:42	8.77	8.99	12.67	1,475.08
16:43	8.78	8.98	11.69	1,481.05
16:44	8.78	8.98	12.69	1,486.21
16:45	8.78	8.98	12.72	1,483.08
16:46	8.75	8.99	12.26	1,478.34
16:47	8.77	9.01	12.40	1,485.17
16:48	8.77	8.99	12.99	1,477.69
16:49	8.80	8.97	12.80	1,476.65
16:50	8.77	8.99	12.61	1,478.72
16:51	8.75	9.01	12.06	1,482.89
16:52	8.76	8.99	11.83	1,485.16
16:53	8.76	8.98	12.48	1,487.07
16:54	8.76	8.97	12.18	1,489.15
16:55	8.75	9.00	13.44	1,485.72
16:56	8.76	9.00	12.54	1,485.62

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Uncorrected Run Average (C_{obs})	8.8	9.0	12.5	1,482.5
Cal Gas Concentration (C_{MA})	10.0	10.0	12.0	1,200.0
Pretest System Zero Response	0.09	0.07	0.00	0.52
Posttest System Zero Response	0.01	0.07	0.02	0.46
Average Zero Response (Co)	0.1	0.1	0.0	0.5
Pretest System Cal Response	10.03	10.02	12.32	1,226.79
Posttest System Cal Response	10.01	10.01	12.73	1,213.36
Average Cal Response (C_M)	10.0	10.0	12.5	1,220.1
Corrected Run Average (Corr)	8.7	9.0	12.0	1,458.2

Appendix C

Location Energy Transfer Partners - LNG Plant
Source P-05-04A/113
Project No. 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Make	Seromex	Seromex	Seromex	CAI
Model	4900	4900	4900	700 CLD
S/N	100384	100384	100384	200023
Operating Range	25	25	500	3000
Cylinder ID				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	EB0023197	EB0023197	SX36796	SX89072
High	EB0023197	EB0023197	SX36796	SX89072
Cylinder Certifed Values				
Low	NA	NA	NA	NA
Mid	19.97	20.02	49.3	5030
High	19.97	20.02	49.3	5030
Cylinder Expiration Date				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	5/26/29	5/26/29	12/1/28	4/11/27
High	5/26/29	5/26/29	12/1/28	4/11/27

Alliance SOURCE TESTING

Calibration Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418
Date: 8/19/21

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Expected Average Concentration	10.0	9.5	12.0	1,200.0
Span Between				
Low	10.0	9.5	12.0	1,200.0
High	50.0	47.5	60.0	6,000.0
Desired Span	20.0	20.0	25.0	2,500.0
Low Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Mid Range Gas				
Low	8.0	8.0	10.0	1,000.0
High	12.0	12.0	15.0	1,500.0
High Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Actual Concentration (% or ppm)				
Zero	0.0	0.0	0.0	0.0
Low	NA	NA	NA	NA
Mid	10.0	10.0	12.0	1,200.0
High	**20.0**	20.0	25.0	2,500.0
Response Time (seconds)	60.0	60.0	60.0	60.0
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid	Mid
Instrument Response (% or ppm)				
Zero	0.0	0.1	0.1	0.4
Low	NA	NA	NA	NA
Mid	10.0	10.0	11.8	1,210.7
High	20.0	20.0	24.9	2,507.9
Performance (% of Span or Cal. Gas Conc.)				
Zero	0.0	0.3	0.6	0.0
Low	NA	NA	NA	NA
Mid	0.2	0.1	0.9	0.4
High	0.1	0.1	0.6	0.3
Status				
Zero	PASS	PASS	PASS	PASS
Low	NA	NA	NA	NA
Mid	PASS	PASS	PASS	PASS
High	PASS	PASS	PASS	PASS

Alliance SOURCE TESTING

Bias/Drift Determinations

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04A/113
Project No.: 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet
Run 1 Date 8/19/21			
Span Value	20.0	20.0	25.0
Initial Instrument Zero Cal Response	0.0	0.1	0.1
Initial Instrument Upscale Cal Response	10.0	10.0	11.8
Final Instrument Zero Cal Response	0.0	0.1	0.1
Final Instrument Upscale Cal Response	10.0	10.0	11.8
Pretest System Zero Response	0.1	0.1	0.6
Posttest System Zero Response	0.1	0.1	0.6
Pretest System Upscale Response	10.1	9.9	12.1
Posttest System Upscale Response	10.1	10.0	12.2
Bias (%)			
Pretest Zero	0.3	0.3	1.8
Posttest Zero	0.5	0.1	1.7
Pretest Span	0.1	-0.3	1.2
Posttest Span	0.1	-0.2	1.8
Drift (%)			
Zero	0.2	-0.2	-0.1
Mid	0.0	0.1	0.6
Run 2 Date 8/19/21			
Span Value	20.0	20.0	25.0
Instrument Zero Cal Response	0.0	0.1	0.1
Instrument Upscale Cal Response	10.0	10.0	11.8
Pretest System Zero Response	0.1	0.1	0.6
Posttest System Zero Response	0.1	0.1	0.0
Pretest System Upscale Response	10.1	10.0	12.2
Posttest System Upscale Response	10.1	10.0	12.2
Bias (%)			
Pretest Zero	0.5	0.1	1.7
Posttest Zero	0.3	0.1	-0.5
Pretest Span	0.1	-0.2	1.8
Posttest Span	0.1	-0.2	1.6
Drift (%)			
Zero	-0.3	0.0	-2.2
Mid	0.0	0.0	-0.2
Run 3 Date 8/19/21			
Span Value	20.0	20.0	25.0
Instrument Zero Cal Response	0.0	0.1	0.1
Instrument Upscale Cal Response	10.0	10.0	11.8
Pretest System Zero Response	0.1	0.1	0.0
Posttest System Zero Response	0.1	0.1	0.0
Pretest System Upscale Response	10.1	10.0	12.2
Posttest System Upscale Response	10.1	10.0	12.4
Bias (%)			
Pretest Zero	0.3	0.1	-0.5
Posttest Zero	0.5	0.1	-0.5
Pretest Span	0.1	-0.2	1.6
Posttest Span	0.2	-0.1	2.4
Drift (%)			
Zero	0.3	0.0	0.0
Mid	0.0	0.1	0.8

Alliance SOURCE TESTING

QA Data

Location Energy Transfer Partners - LNG Plant
Source P-05-04B/113
Project No. 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Make	Seromex	Seromex	Seromex	CAI
Model	4900	4900	4900	700 CLD
S/N	100384	100384	100384	200023
Operating Range	25	25	500	3000
Cylinder ID				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	EB0023197	EB0023197	SX36796	SX89072
High	EB0023197	EB0023197	SX36796	SX89072
Cylinder Certifed Values				
Low	NA	NA	NA	NA
Mid	19.97	20.02	49.3	5030
High	19.97	20.02	49.3	5030
Cylinder Expiration Date				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	5/26/29	5/26/29	12/1/28	4/11/27
High	5/26/29	5/26/29	12/1/28	4/11/27

Alliance SOURCE TESTING

Calibration Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04B/113
Project No.: 2021-0418
Date: 8/19/21

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Expected Average Concentration	10.0	9.5	12.0	1,200.0
Span Between				
Low	10.0	9.5	12.0	1,200.0
High	50.0	47.5	60.0	6,000.0
Desired Span	20.0	20.0	25.0	2,500.0
Low Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Mid Range Gas				
Low	8.0	8.0	10.0	1,000.0
High	12.0	12.0	15.0	1,500.0
High Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Actual Concentration (% or ppm)				
Zero	0.0	0.0	0.0	0.0
Low	NA	NA	NA	NA
Mid	10.0	10.0	12.0	1,200.0
High	**20.0**	20.0	25.0	2,500.0
Response Time (seconds)	60.0	60.0	60.0	60.0
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid	Mid
Instrument Response (% or ppm)				
Zero	0.0	0.1	0.1	0.4
Low	NA	NA	NA	NA
Mid	10.0	10.0	11.8	1,210.7
High	20.0	20.0	24.9	2,507.9
Performance (% of Span or Cal. Gas Conc.)				
Zero	0.0	0.3	0.6	0.0
Low	NA	NA	NA	NA
Mid	0.2	0.1	0.9	0.4
High	0.1	0.1	0.6	0.3
Status				
Zero	PASS	PASS	PASS	PASS
Low	NA	NA	NA	NA
Mid	PASS	PASS	PASS	PASS
High	PASS	PASS	PASS	PASS

Alliance SOURCE TESTING

Bias/Drift Determinations

Location: Energy Transfer Partners - LNG Plant
Source: P-05-04B/113
Project No.: 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet
Run 1 Date 8/19/21			
Span Value	20.0	20.0	25.0
Initial Instrument Zero Cal Response	0.0	0.1	0.1
Initial Instrument Upscale Cal Response	10.0	10.0	11.8
Final Instrument Zero Cal Response	0.0	0.1	0.1
Final Instrument Upscale Cal Response	10.0	10.0	11.8
Pretest System Zero Response	0.1	0.1	0.0
Posttest System Zero Response	0.0	0.1	0.1
Pretest System Upscale Response	10.1	10.0	12.4
Posttest System Upscale Response	10.1	10.0	12.3
Bias (%)			
Pretest Zero	0.5	0.1	-0.5
Posttest Zero	0.2	0.0	-0.1
Pretest Span	0.2	-0.1	2.4
Posttest Span	0.1	-0.1	2.2
Drift (%)			
Zero	-0.3	-0.1	0.4
Mid	0.0	0.1	-0.2
Run 2 Date 8/19/21			
Span Value	20.0	20.0	25.0
Instrument Zero Cal Response	0.0	0.1	0.1
Instrument Upscale Cal Response	10.0	10.0	11.8
Pretest System Zero Response	0.0	0.1	0.1
Posttest System Zero Response	0.0	0.1	0.0
Pretest System Upscale Response	10.1	10.0	12.3
Posttest System Upscale Response	10.1	10.0	11.9
Bias (%)			
Pretest Zero	0.2	0.0	-0.1
Posttest Zero	0.1	0.1	-0.4
Pretest Span	0.1	-0.1	2.2
Posttest Span	0.1	-0.2	0.6
Drift (%)			
Zero	-0.1	0.1	-0.4
Mid	0.0	-0.1	-1.5
Run 3 Date 8/19/21			
Span Value	20.0	20.0	25.0
Instrument Zero Cal Response	0.0	0.1	0.1
Instrument Upscale Cal Response	10.0	10.0	11.8
Final Instrument Zero Cal Response	0.0	0.1	0.1
Final Instrument Upscale Cal Response	10.0	10.0	11.8
Pretest System Zero Response	0.0	0.1	0.0
Posttest System Zero Response	0.0	0.1	0.4
Pretest System Upscale Response	10.1	10.0	11.9
Posttest System Upscale Response	10.0	9.9	11.3
Bias (%)			
Pretest Zero	0.1	0.1	-0.4
Posttest Zero	0.2	0.1	1.2
Pretest Span	0.1	-0.2	0.6
Posttest Span	0.0	-0.2	-2.0
Drift (%)			
Zero	0.1	0.1	1.6
Mid	-0.1	-0.1	-2.6

Alliance SOURCE TESTING

QA Data

Location Energy Transfer Partners - LNG Plant
Source P-05-06A/113
Project No. 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Make	Seromex	Seromex	Seromex	CAI
Model	4900	4900	4900	700 CLD
S/N	100384	100384	100384	200023
Operating Range	25	25	500	3000
Cylinder ID				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	EB0023197	EB0023197	SX36796	SX89072
High	EB0023197	EB0023197	SX36796	SX89072
Cylinder Certifed Values				
Low	NA	NA	NA	NA
Mid	19.97	20.02	49.3	5030
High	19.97	20.02	49.3	5030
Cylinder Expiration Date				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	5/26/29	5/26/29	12/1/28	4/11/27
High	5/26/29	5/26/29	12/1/28	4/11/27

Alliance SOURCE TESTING

Calibration Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06A/113
Project No.: 2021-0418
Date: 8/19/21

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Expected Average Concentration	10.0	9.5	12.0	1,200.0
Span Between				
Low	10.0	9.5	12.0	1,200.0
High	50.0	47.5	60.0	6,000.0
Desired Span	20.0	20.0	25.0	2,500.0
Low Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Mid Range Gas				
Low	8.0	8.0	10.0	1,000.0
High	12.0	12.0	15.0	1,500.0
High Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Actual Concentration (% or ppm)				
Zero	0.0	0.0	0.0	0.0
Low	NA	NA	NA	NA
Mid	10.0	10.0	12.0	1,200.0
High	**20.0**	20.0	25.0	2,500.0
Response Time (seconds)	60.0	60.0	60.0	60.0
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid	Mid
Instrument Response (% or ppm)				
Zero	0.0	0.1	0.1	0.4
Low	NA	NA	NA	NA
Mid	10.0	10.0	11.8	1,210.7
High	20.0	20.0	24.9	2,507.9
Performance (% of Span or Cal. Gas Conc.)				
Zero	0.0	0.3	0.6	0.0
Low	NA	NA	NA	NA
Mid	0.2	0.1	0.9	0.4
High	0.1	0.1	0.6	0.3
Status				
Zero	PASS	PASS	PASS	PASS
Low	NA	NA	NA	NA
Mid	PASS	PASS	PASS	PASS
High	PASS	PASS	PASS	PASS

Alliance SOURCE TESTING

Bias/Drift Determinations

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06A/113
Project No.: 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Run 1 Date 8/19/21				
Span Value	20.0	20.0	25.0	2,500.0
Initial Instrument Zero Cal Response	0.0	0.1	0.1	0.4
Initial Instrument Upscale Cal Response	10.0	10.0	11.8	1,210.7
Final Instrument Zero Cal Response	0.0	0.1	0.1	0.4
Final Instrument Upscale Cal Response	10.0	10.0	11.8	1,210.7
Pretest System Zero Response	0.1	0.1	0.5	0.3
Posttest System Zero Response	0.1	0.1	0.5	0.9
Pretest System Upscale Response	10.1	9.9	11.9	1,230.9
Posttest System Upscale Response	10.1	9.9	11.9	1,215.7
Bias (%)				
Pretest Zero	0.5	0.0	1.4	0.0
Posttest Zero	0.5	0.1	1.5	0.0
Pretest Span	0.4	-0.2	0.6	0.8
Posttest Span	0.3	-0.2	0.4	0.2
Drift (%)				
Zero	-0.1	0.1	0.1	0.0
Mid	0.0	0.0	-0.2	-0.6
Run 2 Date 8/19/21				
Span Value	20.0	20.0	25.0	2,500.0
Instrument Zero Cal Response	0.0	0.1	0.1	0.4
Instrument Upscale Cal Response	10.0	10.0	11.8	1,210.7
Pretest System Zero Response	0.1	0.1	0.5	0.9
Posttest System Zero Response	0.1	0.1	0.5	0.7
Pretest System Upscale Response	10.1	9.9	11.9	1,215.7
Posttest System Upscale Response	10.1	9.9	11.7	1,233.9
Bias (%)				
Pretest Zero	0.5	0.1	1.5	0.0
Posttest Zero	0.6	0.2	1.5	0.0
Pretest Span	0.3	-0.2	0.4	0.2
Posttest Span	0.2	-0.2	-0.4	0.9
Drift (%)				
Zero	0.1	0.1	0.0	0.0
Mid	-0.1	0.0	-0.8	0.7
Run 3 Date 8/19/21				
Span Value	20.0	20.0	25.0	2,500.0
Instrument Zero Cal Response	0.0	0.1	0.1	0.4
Instrument Upscale Cal Response	10.0	10.0	11.8	1,210.7
Pretest System Zero Response	0.1	0.1	0.5	0.7
Posttest System Zero Response	0.1	0.1	0.6	0.9
Pretest System Upscale Response	10.1	9.9	11.7	1,233.9
Posttest System Upscale Response	10.1	9.9	12.1	1,232.6
Bias (%)				
Pretest Zero	0.6	0.2	1.5	0.0
Posttest Zero	0.3	0.3	1.8	0.0
Pretest Span	0.2	-0.2	-0.4	0.9
Posttest Span	0.1	-0.3	1.2	0.9
Drift (%)				
Zero	-0.3	0.1	0.2	0.0
Mid	-0.1	-0.1	1.5	-0.1

Alliance SOURCE TESTING

QA Data

Location Energy Transfer Partners - LNG Plant
Source P-05-06B/113
Project No. 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Make	Seromex	Seromex	Seromex	CAI
Model	4900	4900	4900	700 CLD
S/N	100384	100384	100384	200023
Operating Range	25	25	500	3000
Cylinder ID				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	EB0023197	EB0023197	SX36796	SX89072
High	EB0023197	EB0023197	SX36796	SX89072
Cylinder Certifed Values				
Low	NA	NA	NA	NA
Mid	19.97	20.02	49.3	5030
High	19.97	20.02	49.3	5030
Cylinder Expiration Date				
Zero	NA	NA	NA	NA
Low	NA	NA	NA	NA
Mid	5/26/29	5/26/29	12/1/28	4/11/27
High	5/26/29	5/26/29	12/1/28	4/11/27

Alliance SOURCE TESTING

Calibration Data

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06B/113
Project No.: 2021-0418
Date: 8/18/21

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Expected Average Concentration	10.0	10.0	12.0	1,200.0
Span Between				
Low	10.0	10.0	12.0	1,200.0
High	50.0	50.0	60.0	6,000.0
Desired Span	**20.0**	20.0	25.0	2,500.0
Low Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Mid Range Gas				
Low	8.0	8.0	10.0	1,000.0
High	12.0	12.0	15.0	1,500.0
High Range Gas				
Low	NA	NA	NA	NA
High	NA	NA	NA	NA
Actual Concentration (% or ppm)				
Zero	0.0	0.0	0.0	0.0
Low	NA	NA	NA	NA
Mid	10.00	10.00	12.0	1,200
High	**20.00**	19.97	25.0	2,500
Response Time (seconds)	60.0	60.0	60.0	60.0
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid	Mid
Instrument Response (% or ppm)				
Zero	0.0	0.1	0.0	0.4
Low	NA	NA	NA	NA
Mid	10.2	10.0	11.6	1,201.4
High	20.1	20.0	25.4	2,505.6
Performance (% of Span or Cal. Gas Conc.)				
Zero	0.0	0.4	0.0	0.0
Low	NA	NA	NA	NA
Mid	1.1	0.0	1.7	0.1
High	0.4	0.2	1.4	0.2
Status				
Zero	PASS	PASS	PASS	PASS
Low	NA	NA	NA	NA
Mid	PASS	PASS	PASS	PASS
High	PASS	PASS	PASS	PASS

Alliance SOURCE TESTING

Bias/Drift Determinations

Location: Energy Transfer Partners - LNG Plant
Source: P-05-06B/113
Project No.: 2021-0418

Parameter	O_2 - Outlet	CO_2 - Outlet	CO - Outlet	NOx - Outlet
Run 1 Date 8/18/21				
Span Value	20.0	20.0	25.0	2,500.0
Initial Instrument Zero Cal Response	0.0	0.1	0.0	0.4
Initial Instrument Upscale Cal Response	10.2	10.0	11.6	1,201.4
Final Instrument Zero Cal Response	0.0	0.1	0.0	0.4
Final Instrument Upscale Cal Response	10.2	10.0	11.6	1,201.4
Pretest System Zero Response	0.2	0.0	0.0	0.2
Posttest System Zero Response	0.1	0.1	0.0	0.2
Pretest System Upscale Response	10.1	10.0	12.8	1,237.4
Posttest System Upscale Response	10.1	10.0	12.4	1,223.0
Bias (%)				
Pretest Zero	0.8	-0.4	0.0	0.0
Posttest Zero	0.4	-0.2	0.0	0.0
Pretest Span	-0.4	-0.2	4.8	1.4
Posttest Span	-0.7	0.1	3.2	0.9
Drift (%)				
Zero	-0.4	0.2	0.0	0.0
Mid	-0.4	0.3	-1.6	-0.6
Run 2 Date 8/18/21				
Span Value	20.0	20.0	25.0	2,500.0
Instrument Zero Cal Response	0.0	0.1	0.0	0.4
Instrument Upscale Cal Response	10.2	10.0	11.6	1,201.4
Pretest System Zero Response	0.1	0.1	0.0	0.2
Posttest System Zero Response	0.1	0.1	0.0	0.5
Pretest System Upscale Response	10.1	10.0	12.4	1,223.0
Posttest System Upscale Response	10.0	10.0	12.3	1,226.8
Bias (%)				
Pretest Zero	0.4	-0.2	0.0	0.0
Posttest Zero	0.5	-0.1	0.0	0.0
Pretest Span	-0.7	0.1	3.2	0.9
Posttest Span	-0.9	0.1	3.0	1.0
Drift (%)				
Zero	0.1	0.1	0.0	0.0
Mid	-0.2	0.0	-0.2	0.2
Run 3 Date 8/18/21				
Span Value	20.0	20.0	25.0	2,500.0
Instrument Zero Cal Response	0.0	0.1	0.0	0.4
Instrument Upscale Cal Response	10.2	10.0	11.6	1,201.4
Pretest System Zero Response	0.1	0.1	0.0	0.5
Posttest System Zero Response	0.0	0.1	0.0	0.5
Pretest System Upscale Response	10.0	10.0	12.3	1,226.8
Posttest System Upscale Response	10.0	10.0	12.7	1,213.4
Bias (%)				
Pretest Zero	0.5	-0.1	0.0	0.0
Posttest Zero	0.1	-0.1	0.0	0.0
Pretest Span	-0.9	0.1	3.0	1.0
Posttest Span	-1.0	0.1	4.6	0.5
Drift (%)				
Zero	-0.4	0.0	0.1	0.0
Mid	-0.1	-0.1	1.6	-0.5

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 2
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI60E15A0286	Reference Number:	160-402116078-1
Cylinder Number:	EB0023197	Cylinder Volume:	159.6 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12021	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 26, 2021

Expiration Date: May 26, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	20.00 %	20.02 %	G1	+/- 0.1% NIST Traceable	05/26/2021
OXYGEN	20.00 %	19.97 %	G1	+/- 0.5% NIST Traceable	05/26/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	060118	K008735	23.04 % CARBON DIOXIDE/NITROGEN	+/- 0.1%	Jun 27, 2022
NTRM	08010230	K005228	23.20 % OXYGEN/NITROGEN	+/-0.4%	Jun 01, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA VA5011 T5V6VU9P NDIR CO2	NDIR	May 13, 2021
SIEMENS OXYMAT 6 - N1-W5-951 - O2	PARAMAGNETIC	May 20, 2021

Triad Data Available Upon Request

Signature on file

Approved for Release

MATHESON
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1700 Soepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer: MATHESON VALLEY
201 CROWN POINT RD
THOROFARE, NJ 08086

Customer PO#: 11/6/2020 MATT THURSTON

Part #: G2688367

Protocol:	Reference #:	Lot#:
G1	776655-3	9300613284

Cylinder Number: SX36796
Cylinder Pressure: 1900 psig
Last Analysis Date: 12/9/2020
Expiration Date: 12/1/2028

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

				REPLICATE RESPONSES		
Component:	Carbon Monoxide			Date: 12/1/2020		
				49.3		
Certified Conc:	49.3 ppm	+/- 0.2 ppm	ABS	49.3		
				49.3		
Component:	Nitric Oxide			Date: 12/1/2020	Date:	12/9/2020
				50.8		50.9
Certified Conc:	50.9 ppm	+/- 0.2 ppm	ABS	50.9		50.9
				50.9		50.9
NOx:	50.9 ppm	Reference Only				

BALANCE GAS: Nitrogen

REFERENCE STANDARDS:

Component:	Carbon Monoxide	Component:	Nitric Oxide
Reference Standard:	NTRM	Reference Standard:	PRM
Cylinder #:	ND42697	Cylinder #:	APEX1257580
Concentration:	98.79ppm+/-0.83ppm (abs)	Concentration:	48.99ppm+/-0.20ppm (abs)
Exp. Date:	8/13/2021	Exp. Date:	5/23/2022
SRM or Cert #:	N/A	SRM or Cert #:	C1678310.02
Sample #:	151102	Sample #:	N/A

CERTIFICATION INSTRUMENTS

Component:	Carbon Monoxide	Component:	Nitric Oxide
Make/Model:	HORIBA VIA-510	Make/Model:	CAI 700
Serial Number:	XT4F064G	Serial Number:	1707006
Measurement Principle:	NDIR	Measurement Principle:	CHEMI
Last Calibration:	11/20/2020	Last Calibration:	11/13/2020

Notes:

The certification was performed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA Vendor ID Number: D62020, PGVP Participation Date: 01/01/20, PGVP Renewal Date: 01/01/21
The expanded uncertainty listed for each component was calculated at a coverage factor of k=2 and at a level of confidence of 95%.

Analyst: Cierra Freed
Cierra Freed

Accredited by:
ANAB

ANAB ACCREDITED TESTING LABORATORY

Date: 12/10/2020

MATHESON
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1650 Enterprise Parkway
Twinsburg, OH 44087
215-648-4000

Certificate of Analysis – EPA Protocol Mixtures

Customer: Matheson Valley
Cylinder Number: SX- 89072
Cylinder Pressure: 1800 psig
Last Analysis Date: 4/25/2019
Expiration Date: 4/11/2027

Protocol:	Reference #:	Lot#:
G2	746957	109-96-41467

Part #: G 2688368

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

Component: Nitric Oxide

Certified Conc: 5030 ppm +/- 30 ppm

REPLICATE RESPONSES	Date: 4/11/2019	Date: 4/25/2019
	5030 ppm	5030 ppm
	5030 ppm	5030 ppm
	5010 ppm	5020 ppm

Component: Carbon Monoxide

Certified Conc: 4960 ppm +/- 40 ppm

Date: 4/11/2019
4970 ppm
4950 ppm
4970 ppm

BALANCE GAS: Nitrogen

REFERENCE STANDARDS:

Component:	Nitric Oxide	Carbon Monoxide
SRM #:	PRM-NO1000	SRM-2637a
Sample #:	C1474410.01	56-G-18
Cylinder #:	D648777	FF20716
Concentration:	996.8 ppm	2472.8 ppm

CERTIFICATION INSTRUMENTS

Component:	Nitric Oxide	Carbon Monoxide
Make/Model:	NOX CLA-510SS	CO Horiba VIA-510 HIGH
Serial Number:	XXFD0YW0	ML0E13T1
Measurement Principle:	Chemiluminescence	NDIR
Last Calibration:	4/22/2019	3/29/2019

Notes: Nox = 5030 ppm REFERENCE VALUE ONLY

The certification was performed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA Vendor ID Number: D42019, PGVP Participation Date: 01/01/19, PGVP Renewal Date: 01/01/20. The expanded uncertainty listed for each component was calculated at a coverage factor of k=2 and at a level of confidence of 95%.

Analyst: _____ Date 4/26/2019

Alliance SOURCE TESTING

EPA Method 205
Field Calibration of Dilution System

Location: Energy Transfer Partners - LNG Plant
Project No.: 2021-TBD
Date 8/18/21

Analyzer Make:	CAI
Analyzer Model:	700 CLD
Analyzer SN:	2001023
Environics ID:	6096
Component/Balance Gas:	Nox/N2
Cylinder Gas ID (Dilution):	SX44075
Cylinder Gas Concentration (Dilution), ppm:	495.3
Cylinder Gas ID (Mid-Level):	SX36796
Cylinder Gas Concentration (Mid-Level), ppm:	50.9

Target Mass Flow Contollers	Target Dilution (%)	Target Flow Rate lpm	Target Concentration (ppm)	Actual Concentration (ppm)	Injection 1 Analyzer Concentration (ppm)	Injection 2 Analyzer Concentration (ppm)	Injection 3 Analyzer Concentration (ppm)	Average Analyzer Concentration (ppm)	Difference (ppm)	Average Error (±2 %)
10L/5L	80.0	5.0	396.2	397.8	396.2	398.1	400.3	398.19	0.39	0.1%
10L/5L	50.0	5.0	247.7	248.7	248.5	250.4	249.4	249.41	0.71	0.3%
10L/1L	20.0	4.0	99.1	99.5	99.8	100.4	99.7	99.92	0.42	0.4%
10L/1L	10.0	4.0	49.5	49.7	49.4	48.2	49.8	49.12	-0.58	-1.2%

*Not all AST Environics Units have 2-10L Mass Flow Controllers. For these units the 90% @ 7lpm and 80% @ 7lpm injections will not be conducted.

Average Analyzer Concentration (ppm)	Injection 1 Error (±2 %)	Injection 2 Error (±2 %)	Injection 3 Error (±2 %)
398.19	-0.5%	0.0%	0.5%
249.41	-0.4%	0.4%	0.0%
99.92	-0.2%	0.4%	-0.3%
49.12	0.5%	-1.8%	1.3%

Mid-Level Supply Gas Calibration Direct to Analyzer

Calibration Gas Concentration (ppm)	Injection 1 Analyzer Concentration (ppm)	Injection 2 Analyzer Concentration (ppm)	Injection 3 Analyzer Concentration (ppm)	Average Analyzer Concentration (ppm)	Difference (ppm)	Average Error (±2 %)
50.90	51.0	51.6	51.5	51.37	0.47	0.9%

MATHESON
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1700 Scepter Rd
Waverly, TN [illegible]
931-296-[illegible]

Certificate of Analysis - EPA Protocol Mixture

Part #: [illegible]
Lot: [illegible]

Customer: Matheson Valley
201 Crown Point Rd
Thorofare, NJ 08086

Customer PO#:
11/6/2020 MATT THURSTON

Protocol: G1
Reference #: 778655-02

Cylinder Number: SX44075
Cylinder Pressure: 1900 psig
Last Analysis Date: 12/10/2020
Expiration Date: 12/3/2028

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

Component: Carbon Monoxide
Certified Conc. 496.4 ppm +/- 1.5 ppm ABS

Component: Nitric Oxide
Certified Conc. 495.3 ppm +/- 1.9 ppm ABS

NOx: 497.3 ppm Reference Only

BALANCE GAS: Nitrogen

REPLICATE RESPONSES

Date: 12/3/2020
496.4
496.3
496.4

Date: 12/3/2020
494.2
495.9
496.4

REFERENCE STANDARDS:

	Carbon Monoxide	Nitric Oxide
Component	Carbon Monoxide	Nitric Oxide
Reference Standard	NTRM	SRM
Cylinder #	ND42640	FF24558
Concentration	490.7 +/- 2.5 ppm ABS	496.38 +/- 2.7 ppm ABS
Exp. Date	8/6/2021	4/1/2023
SRM or Cert #	NA	1685b
Sample #	151103	42-N-13

CERTIFICATION INSTRUMENTS

	Carbon Monoxide	Nitric Oxide
Component	Carbon Monoxide	Nitric Oxide
Make/Model	HORIBA VA 5000	HORIBA CLA-[illegible]
Serial Number	[illegible]	[illegible]
Measurement Principle	NDIR	[illegible]
Last Calibration	11/4/2020	[illegible]

Notes:

[illegible]

Analyst: [signature]

ANAB

Alliance SOURCE TESTING

NOx Converter Efficiency Check

Location: Energy Transfer Partners - LNG Plant
Project No.: 2021-TBD

NO_2 Converter Check - #1					
Analyzer Make	CAI	**Pre-Test Date**		**Time**	
Analyzer Model	700 CLD	**Pre-Test Concentration, ppm**			
Serial Number	200023	**Pre-Test Efficiency, %**			-
Cylinder ID Number	EB0123592	**Post-Test Date**	8/18/21	**Time**	17:16
Cylinder Exp. Date	5/1/22	**Post-Test Concentration, ppm**			46.68
Cylinder Concentration, ppm	47.3	**Post-Test Efficiency, %**			99

**Required Efficiency is ≥ 90 %.*

**Required Efficiency is ≥ 90 %.*

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1700 Scepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer: Matheson Valley

Customer PO #:

Part #
G2688472

Protocol:	Reference #:	Lot#:
G1	T256016-1	9009400481

Cylinder Number: EB0123592
Cylinder Pressure: 2000 psig
Last Analysis Date: 5/1/2019
Expiration Date: 5/1/2022

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

Component: Nitrogen Dioxide
Certified Conc: 47.3 ppm +/- 0.9 ppm ABS

REPLICATE RESPONSES			
Date:	4/24/2019	Date:	5/1/2019
	47.4		47.2
	47.5		47.2
	47.3		47.3

BALANCE GAS: AIR

REFERENCE STANDARDS:

Component: Nitrogen Dioxide
Reference Standard: PRM
Cylinder #: D562925
Concentration: 75.0 +/- 1.1 ppm ABS
Exp. Date: 2/2/2019
NIST Sample #: VSL PRIMARY

Reference Standard: GMIS
Cylinder #: EB0097397
Concentration: 47.8 +/- 0.8 ppm ABS
Exp. Date: 9/21/2021

CERTIFICATION INSTRUMENTS

Component: Nitrogen Dioxide
Make/Model: CAI / 600
Serial Number: Y09003
Measurement Principle: CHEMI
Last Calibration: 5/1/2019

Notes:

The certification was performed by Global Calibration Gases, LLC, Sarasota, FL and according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA PGVP Vendor ID Number: NZ2019.
The expanded uncertainty listed for each component was calculated at a coverage factor of k=2 and at a level of confidence of 95%.

Analyst: Signature on File Date: 5/1/2019

QA: Date: 5/15/2019
Roman Khidekel

Alliance
SOURCE TESTING

Mass Flow Controller Calibration

Dilution System Make:	Environics
Dilution System Model:	4040
Dilution System S/N:	6096
Calibration Equipment Make:	Alicat
Calibration Equipment Model:	M-1SLPM-D/5M
Calibration Equipment S/N:	1
Flow Cell S/N:	197206
Flow Cell S/N:	197208
Calibration Gas:	Nitrogen
Barometric Pressure, mmHg:	29
Ambient Temperature, °F:	70

Mass Flow Controller ID	#1			# 2			# 3		
Size, ccm:	10,000			5,000			1,000		
Make:	Environics			Environics			Environics		
Model:	EFC-202			EFC-202			EFC-202		
S/N:									
	Set Flow cc/min	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**
5%	500	576.90	15.4%	250	255.00	2.0%	50	49.00	2.0%
10%	1,000	1,078.90	7.9%	500	502.00	0.4%	100	100.00	0.0%
20%	2,000	2,039.00	2.0%	1,000	994.90	0.5%	200	200.00	0.0%
30%	3,000	3,049.00	1.6%	1,500	1,483.00	1.1%	300	298.40	0.5%
40%	4,000	4,044.00	1.1%	2,000	1,971.00	1.5%	400	396.60	0.8%
50%	5,000	5,030.00	0.6%	2,500	2,454.00	1.8%	500	494.50	1.1%
60%	6,000	6,015.00	0.2%	3,000	2,939.00	2.0%	600	591.60	1.4%
70%	7,000	6,993.00	0.1%	3,500	3,420.00	2.3%	700	688.00	1.7%
80%	8,000	7,971.00	0.4%	4,000	3,900.00	2.5%	800	784.30	2.0%
90%	9,000	8,945.00	0.6%	4,500	4,388.00	2.5%	900	880.00	2.2%
100%	10,000	9,919.00	0.8%	5,000	4,877.00	2.5%	1,000	977.00	2.3%

784.3

Note: The mass flow controller's calibration values are used by the dilution system's operating software to improve accuracy. These calibrations are not necessarily indicative of the systems overall performance. Performance is verified by conducting a Method 205 prior to each field use.

Calibration Performed By Leo Sullivan

Date 5/15/20

Appendix D

Alliance
SOURCE TESTING

Location Energy Transfer Partners - LNG Plant
Source P-05-04A/113
Project No. 2021-0418

Run Number	Run 1	Run 2	Run 3
Date	8/19/21	8/19/21	8/19/21
Start Time	9:35	10:04	10:32
Stop Time	9:50	10:19	10:47
Engine Operational Data			
Pre Catalyst Temperature, °F (PreT)			
Time, 0 min	817	929	928
Time, 15 min	921	931	919
Average	869	930	924
Catalyst Differential Pressure, in WC (ΔP)			
Time, 0 min	8	5	4
Time, 15 min	5	4	4
Average	6	5	4

Alliance
SOURCE TESTING

Location Energy Transfer Partners - LNG Plant
Source P-05-04B/113
Project No. 2021-0418

Run Number	Run 1	Run 2	Run 3
Date	8/19/21	8/19/21	8/19/21
Start Time	11:17	12:55	13:37
Stop Time	11:32	13:10	13:52
Engine Operational Data			
Pre Catalyst Temperature, °F (PreT)			
Time, 0 min	836	743	952
Time, 15 min	933	936	954
Average	884	840	953
Catalyst Differential Pressure, in WC (ΔP)			
Time, 0 min	2	1	1
Time, 15 min	2	2	2
Average	2	2	2

Alliance
SOURCE TESTING

Location Energy Transfer Partners - LNG Plant
Source P-05-06A/113
Project No. 2021-0418

Run Number	Run 1	Run 2	Run 3
Date	8/19/21	8/19/21	8/19/21
Start Time	7:56	8:26	8:59
Stop Time	8:11	8:41	9:14
Engine Operational Data			
Pre Catalyst Temperature, °F (PreT)			
Time, 0 min	807	826	830
Time, 15 min	819	827	828
Average	813	826	829
Catalyst Differential Pressure, in WC (ΔP)			
Time, 0 min	2	1	2
Time, 15 min	2	2	1
Average	2	1	1

Alliance
SOURCE TESTING

Location Energy Transfer Partners - LNG Plant
Source P-05-06B/113
Project No. 2021-0418

Run Number	Run 1	Run 2	Run 3
Date	8/18/21	8/18/21	8/18/21
Start Time	15:37	16:09	16:42
Stop Time	15:52	16:24	16:57
Engine Operational Data			
Pre Catalyst Temperature, °F (PreT)			
Time, 0 min	927	946	954
Time, 15 min	945	946	960
Average	936	946	957
Catalyst Differential Pressure, in WC (ΔP)			
Time, 0 min	2	2	2
Time, 15 min	2	2	2
Average	2	2	2

Engine:	P-05-04A	Average Dp	
Make:	CAT	Run 1	6.28
Model:	3516	Run 2	4.46
Serial #:	27Z00734	Run 3	4.10
HP:	2294	Avg	4.95

	Date - Time	Governor Position	Inlet Temp	Catalyst DP	
	19-Aug-21 09:20:00	0	91.47	5.75	
	19-Aug-21 09:21:00	0	91.19	5.78	
	19-Aug-21 09:22:00	3.5	92.02	5.82	
	19-Aug-21 09:23:00	10	92.68	5.81	
	19-Aug-21 09:24:00	10	111.97	6.13	
	19-Aug-21 09:25:00	10	145.66	6.96	
	19-Aug-21 09:26:00	10	191.90	7.56	
	19-Aug-21 09:27:00	10	229.35	7.74	
	19-Aug-21 09:28:00	10	249.63	7.76	
	19-Aug-21 09:29:00	30	264.82	7.71	
	19-Aug-21 09:30:00	70	276.18	7.62	
	19-Aug-21 09:31:00	70	454.36	7.89	
	19-Aug-21 09:32:00	70	658.03	8.16	
	19-Aug-21 09:33:00	70	746.66	8.12	
	19-Aug-21 09:34:00	70	788.55	7.91	
Run 1	19-Aug-21 09:35:00	70	817.09	7.67	
	19-Aug-21 09:36:00	70	838.55	7.42	
	19-Aug-21 09:37:00	70	854.28	7.18	
	19-Aug-21 09:38:00	70	866.39	6.94	
	19-Aug-21 09:39:00	70	877.63	6.72	
	19-Aug-21 09:40:00	70	888.57	6.54	
	19-Aug-21 09:41:00	70	895.23	6.38	
	19-Aug-21 09:42:00	70	900.84	6.17	
	19-Aug-21 09:43:00	70	905.15	6.06	
	19-Aug-21 09:44:00	70	908.10	5.99	
	19-Aug-21 09:45:00	70	912.32	5.84	
	19-Aug-21 09:46:00	70	915.82	5.73	
	19-Aug-21 09:47:00	70	917.20	5.60	
	19-Aug-21 09:48:00	70	917.20	5.49	
	19-Aug-21 09:49:00	70	919.61	5.39	
	19-Aug-21 09:50:00	70	921.41	5.30	6.28
	19-Aug-21 09:51:00	70	922.90	5.22	
	19-Aug-21 09:52:00	70	924.07	5.16	
	19-Aug-21 09:53:00	70	924.43	5.10	
	19-Aug-21 09:54:00	70	924.43	5.03	
	19-Aug-21 09:55:00	70	926.79	4.99	
	19-Aug-21 09:56:00	70	928.05	4.96	
	19-Aug-21 09:57:00	70	926.85	4.91	
	19-Aug-21 09:58:00	70	927.42	4.86	

	19-Aug-21 09:59:00	70	928.05	4.82	
	19-Aug-21 10:00:00	70	928.05	4.78	
	19-Aug-21 10:01:00	70	928.05	4.74	
	19-Aug-21 10:02:00	70	928.67	4.69	
	19-Aug-21 10:03:00	70	928.96	4.65	
Run 2	19-Aug-21 10:04:00	70	928.96	4.60	
	19-Aug-21 10:05:00	70	928.37	4.58	
	19-Aug-21 10:06:00	70	930.40	4.56	
	19-Aug-21 10:07:00	70	931.67	4.53	
	19-Aug-21 10:08:00	70	931.67	4.51	
	19-Aug-21 10:09:00	70	931.67	4.50	
	19-Aug-21 10:10:00	70	931.67	4.47	
	19-Aug-21 10:11:00	70	931.06	4.45	
	19-Aug-21 10:12:00	70	930.18	4.45	
	19-Aug-21 10:13:00	70	929.86	4.41	
	19-Aug-21 10:14:00	70	931.00	4.39	
	19-Aug-21 10:15:00	70	931.13	4.39	
	19-Aug-21 10:16:00	70	931.32	4.38	
	19-Aug-21 10:17:00	70	929.32	4.39	
	19-Aug-21 10:18:00	70	929.77	4.40	
	19-Aug-21 10:19:00	70	930.76	4.40	4.46
	19-Aug-21 10:20:00	70	931.34	4.42	
	19-Aug-21 10:21:00	70	931.67	4.43	
	19-Aug-21 10:22:00	70	931.67	4.42	
	19-Aug-21 10:23:00	70	931.67	4.42	
	19-Aug-21 10:24:00	70	931.67	4.44	
	19-Aug-21 10:25:00	70	931.67	4.43	
	19-Aug-21 10:26:00	70	931.67	4.40	
	19-Aug-21 10:27:00	70	931.67	4.39	
	19-Aug-21 10:28:00	70	929.56	4.38	
	19-Aug-21 10:29:00	70	930.34	4.34	
	19-Aug-21 10:30:00	70	930.49	4.33	
	19-Aug-21 10:31:00	70	928.62	4.30	
Run 3	19-Aug-21 10:32:00	70	928.05	4.26	
	19-Aug-21 10:33:00	70	928.05	4.25	
	19-Aug-21 10:34:00	70	929.17	4.24	
	19-Aug-21 10:35:00	70	931.03	4.20	
	19-Aug-21 10:36:00	70	931.67	4.19	
	19-Aug-21 10:37:00	70	931.67	4.17	
	19-Aug-21 10:38:00	70	931.67	4.14	
	19-Aug-21 10:39:00	70	931.67	4.12	
	19-Aug-21 10:40:00	70	931.67	4.10	
	19-Aug-21 10:41:00	70	931.67	4.03	
	19-Aug-21 10:42:00	70	931.67	4.03	
	19-Aug-21 10:43:00	70	932.29	4.02	
	19-Aug-21 10:44:00	70	932.01	3.97	
	19-Aug-21 10:45:00	70	929.32	3.95	

19-Aug-21 10:46:00	70	923.11	3.94	
19-Aug-21 10:47:00	70	919.10	3.94	4.10
19-Aug-21 10:48:00	70	917.50	3.91	
19-Aug-21 10:49:00	70	917.20	3.87	
19-Aug-21 10:50:00	70	916.61	3.85	
19-Aug-21 10:51:00	70	916.30	3.81	
19-Aug-21 10:52:00	70	916.89	3.78	
19-Aug-21 10:53:00	70	917.20	3.75	
19-Aug-21 10:54:00	70	917.20	3.74	
19-Aug-21 10:55:00	70	917.20	3.69	
19-Aug-21 10:56:00	70	917.20	3.68	
19-Aug-21 10:57:00	70	917.20	3.66	
19-Aug-21 10:58:00	70	916.66	3.63	
19-Aug-21 10:59:00	70	916.86	3.60	
19-Aug-21 11:00:00	70	917.20	3.55	
19-Aug-21 11:01:00	70	917.20	3.50	
19-Aug-21 11:02:00	70	917.20	3.50	
19-Aug-21 11:03:00	70	917.20	3.36	
19-Aug-21 11:04:00	70	916.00	3.43	
19-Aug-21 11:05:00	66.465001	915.97	3.45	
19-Aug-21 11:06:00	40.685001	916.87	3.40	
19-Aug-21 11:07:00	5	903.10	3.36	
19-Aug-21 11:08:00	5	825.89	3.35	
19-Aug-21 11:09:00	3.25	744.10	3.27	

Engine:	P-05-04B	Average Dp	
Make:	CAT	Run 1	2.08
Model:	3516	Run 2	1.83
Serial #:	27Z00735	Run 3	1.44
HP:	2294	Avg	1.78

	Date - Time	Governor Position	Inlet Temp	Catalyst DP	
	19-Aug-21 11:00:00	0	97.81168	-0.30595	
	19-Aug-21 11:01:00	0	98.60367	-0.32802	
	19-Aug-21 11:02:00	0	98.634	-0.31259	
	19-Aug-21 11:03:00	0	98.23041	-0.30078	
	19-Aug-21 11:04:00	0	97.31603	-0.33811	
	19-Aug-21 11:05:00	0	96.91008	-0.34807	
	19-Aug-21 11:06:00	3.5	97.4811	-0.35141	
	19-Aug-21 11:07:00	10	98.20755	-0.3345	
	19-Aug-21 11:08:00	10	121.0431	-0.33752	
	19-Aug-21 11:09:00	13.5	171.0694	-0.06779	
	19-Aug-21 11:10:00	37.5	213.9548	0.229881	
	19-Aug-21 11:11:00	70	243.9257	-0.12268	
	19-Aug-21 11:12:00	70	424.5423	1.124402	
	19-Aug-21 11:13:00	70	637.0888	1.935452	
	19-Aug-21 11:14:00	70	732.7503	2.054629	
	19-Aug-21 11:15:00	70	782.8071	1.832137	
	19-Aug-21 11:16:00	70	812.2275	2.162744	
Run 1	19-Aug-21 11:17:00	70	835.7367	2.06757	
	19-Aug-21 11:18:00	70	851.9962	2.389828	
	19-Aug-21 11:19:00	70	865.9543	2.59437	
	19-Aug-21 11:20:00	70	878.4685	2.105973	
	19-Aug-21 11:21:00	70	888.9371	2.241639	
	19-Aug-21 11:22:00	70	897.2398	2.282965	
	19-Aug-21 11:23:00	70	904.234	2.400681	
	19-Aug-21 11:24:00	70	910.6415	2.122253	
	19-Aug-21 11:25:00	70	918.5681	1.921468	
	19-Aug-21 11:26:00	70	922.5991	2.006624	
	19-Aug-21 11:27:00	70	926.5249	1.916041	
	19-Aug-21 11:28:00	70	928.7058	1.905606	
	19-Aug-21 11:29:00	70	929.0067	1.824623	
	19-Aug-21 11:30:00	70	931.2929	1.890995	
	19-Aug-21 11:31:00	70	932.6165	1.959872	
	19-Aug-21 11:32:00	70	932.6165	1.674974	2.081593
	19-Aug-21 11:33:00	70	934.3763	1.635526	
	19-Aug-21 11:34:00	45.5	935.9256	1.763678	
	19-Aug-21 11:35:00	0	906.5191	0.054835	
	19-Aug-21 11:36:00	0	847.4494	-1.10666	
	19-Aug-21 11:37:00	0	806.2912	-1.12167	
	19-Aug-21 11:38:00	0	774.1942	-1.10728	

19-Aug-21 11:39:00	0	749.8667	-1.06315
19-Aug-21 11:40:00	0	726.146	-1.02529
19-Aug-21 11:41:00	0	706.1579	-0.98567
19-Aug-21 11:42:00	0	687.9952	-0.95648
19-Aug-21 11:43:00	0	667.5588	-0.88359
19-Aug-21 11:44:00	0	650.0921	-0.82185
19-Aug-21 11:45:00	0	633.0483	-0.80639
19-Aug-21 11:46:00	0	617.5923	-0.76872
19-Aug-21 11:47:00	0	601.6456	-0.72465
19-Aug-21 11:48:00	0	586.7068	-0.66621
19-Aug-21 11:49:00	0	571.9128	-0.65069
19-Aug-21 11:50:00	0	558.3963	-0.60717
19-Aug-21 11:51:00	0	544.7554	-0.563
19-Aug-21 11:52:00	0	532.2907	-0.52135
19-Aug-21 11:53:00	0	520.2668	-0.49292
19-Aug-21 11:54:00	0	507.2331	-0.46857
19-Aug-21 11:55:00	0	495.8694	-0.42356
19-Aug-21 11:56:00	0	487.3599	-0.39586
19-Aug-21 11:57:00	0	476.7495	-0.37079
19-Aug-21 11:58:00	0	465.6706	-0.3686
19-Aug-21 11:59:00	0	456.137	-0.36194
19-Aug-21 12:00:00	0	447.2175	-0.3509
19-Aug-21 12:01:00	0	437.6791	-0.35305
19-Aug-21 12:02:00	0	428.7	-0.356
19-Aug-21 12:03:00	0	421.0596	-0.35063
19-Aug-21 12:04:00	0	413.5733	-0.34512
19-Aug-21 12:05:00	0	406.5472	-0.33046
19-Aug-21 12:06:00	0	399.014	-0.31189
19-Aug-21 12:07:00	0	391.7943	-0.30595
19-Aug-21 12:08:00	0	384.9044	-0.30084
19-Aug-21 12:09:00	0	378.6368	-0.27043
19-Aug-21 12:10:00	0	373.0873	-0.2562
19-Aug-21 12:11:00	0	367.663	-0.24014
19-Aug-21 12:12:00	0	359.9802	-0.24701
19-Aug-21 12:13:00	0	353.8854	-0.21175
19-Aug-21 12:14:00	0	348.5762	-0.19493
19-Aug-21 12:15:00	0	341.4367	-0.2029
19-Aug-21 12:16:00	0	335.6094	-0.17334
19-Aug-21 12:17:00	0	329.8242	-0.15582
19-Aug-21 12:18:00	0	324.3591	-0.13999
19-Aug-21 12:19:00	0	318.9288	-0.14148
19-Aug-21 12:20:00	0	312.4694	-0.13102
19-Aug-21 12:21:00	0	307.6524	-0.1199
19-Aug-21 12:22:00	0	301.9402	-0.12107
19-Aug-21 12:23:00	0	297.3176	-0.10724
19-Aug-21 12:24:00	0	293.0825	-0.10307
19-Aug-21 12:25:00	0	286.7275	-0.11433

	19-Aug-21 12:26:00	0	282.0392	-0.10995	
	19-Aug-21 12:27:00	0	278.975	-0.0927	
	19-Aug-21 12:28:00	0	274.5337	-0.09855	
	19-Aug-21 12:29:00	0	268.6204	-0.10578	
	19-Aug-21 12:30:00	0	264.0673	-0.1383	
	19-Aug-21 12:31:00	0	261.4721	-0.13905	
	19-Aug-21 12:32:00	0	257.7455	-0.10795	
	19-Aug-21 12:33:00	0	254.087	-0.09765	
	19-Aug-21 12:34:00	0	249.9431	-0.1028	
	19-Aug-21 12:35:00	0	246.4124	-0.10036	
	19-Aug-21 12:36:00	0	243.084	-0.09765	
	19-Aug-21 12:37:00	0	238.8727	-0.12241	
	19-Aug-21 12:38:00	0	235.5734	-0.14177	
	19-Aug-21 12:39:00	0	234.2693	-0.15144	
	19-Aug-21 12:40:00	0	232.0822	-0.15861	
	19-Aug-21 12:41:00	0	228.2311	-0.16549	
	19-Aug-21 12:42:00	0	227.0443	-0.17623	
	19-Aug-21 12:43:00	0	224.6952	-0.18246	
	19-Aug-21 12:44:00	0	220.9706	-0.19586	
	19-Aug-21 12:45:00	0	218.2591	-0.17772	
	19-Aug-21 12:46:00	0	216.9291	-0.15271	
	19-Aug-21 12:47:00	0	213.4661	-0.15798	
	19-Aug-21 12:48:00	3	211.7495	-0.14933	
	19-Aug-21 12:49:00	10	210.2513	-0.15266	
	19-Aug-21 12:50:00	25.833333	228.9715	-0.28095	
	19-Aug-21 12:51:00	60	265.2093	-0.12246	
	19-Aug-21 12:52:00	60	417.2947	0.709942	
	19-Aug-21 12:53:00	60	599.7366	1.193288	
	19-Aug-21 12:54:00	60	697.8398	1.091402	
Run 2	19-Aug-21 12:55:00	60	743.0685	1.325373	
	19-Aug-21 12:56:00	60	773.4816	1.383814	
	19-Aug-21 12:57:00	60	796.5697	1.1584	
	19-Aug-21 12:58:00	60	815.2959	1.529916	
	19-Aug-21 12:59:00	60	829.8557	1.355011	
	19-Aug-21 13:00:00	60	842.1894	1.609228	
	19-Aug-21 13:01:00	60	854.7788	1.603592	
	19-Aug-21 13:02:00	60	865.0669	1.270689	
	19-Aug-21 13:03:00	62.5	871.339	1.645545	
	19-Aug-21 13:04:00	70	877.1599	1.680609	
	19-Aug-21 13:05:00	70	885.3874	2.243726	
	19-Aug-21 13:06:00	70	902.6847	2.589361	
	19-Aug-21 13:07:00	70	915.7705	2.740472	
	19-Aug-21 13:08:00	70	925.2163	2.542817	
	19-Aug-21 13:09:00	70	929.0067	2.318864	
	19-Aug-21 13:10:00	70	936.2264	2.281295	1.82992
	19-Aug-21 13:11:00	70	939.8362	2.26105	
	19-Aug-21 13:12:00	70	939.8362	2.009964	

	19-Aug-21 13:13:00	70	941.5961	1.709412	
	19-Aug-21 13:14:00	70	945.5519	1.855513	
	19-Aug-21 13:15:00	70	949.3422	1.75032	
	19-Aug-21 13:16:00	70	950.6658	1.597331	
	19-Aug-21 13:17:00	70	951.2524	1.576042	
	19-Aug-21 13:18:00	70	952.6813	1.695219	
	19-Aug-21 13:19:00	70	953.9749	1.671843	
	19-Aug-21 13:20:00	70	954.2757	1.606306	
	19-Aug-21 13:21:00	70	954.2757	1.678104	
	19-Aug-21 13:22:00	70	954.2757	1.624255	
	19-Aug-21 13:23:00	70	954.2757	1.417208	
	19-Aug-21 13:24:00	70	953.1025	1.671217	
	19-Aug-21 13:25:00	70	953.6139	1.582095	
	19-Aug-21 13:26:00	70	954.2757	1.53242	
	19-Aug-21 13:27:00	70	954.2757	1.780376	
	19-Aug-21 13:28:00	70	954.2757	1.554753	
	19-Aug-21 13:29:00	70	954.2757	1.525741	
	19-Aug-21 13:30:00	70	954.2757	1.246061	
	19-Aug-21 13:31:00	70	954.2757	1.331217	
	19-Aug-21 13:32:00	70	954.2757	1.617994	
	19-Aug-21 13:33:00	70	954.2757	1.45269	
	19-Aug-21 13:34:00	70	955.9904	1.130849	
	19-Aug-21 13:35:00	70	957.5547	1.282378	
	19-Aug-21 13:36:00	70	955.6595	1.155895	
Run 3	19-Aug-21 13:37:00	70	951.9894	1.292396	
	19-Aug-21 13:38:00	70	952.3805	1.534925	
	19-Aug-21 13:39:00	70	953.412	1.571036	
	19-Aug-21 13:40:00	70	956.9137	1.115486	
	19-Aug-21 13:41:00	70	958.2315	1.325999	
	19-Aug-21 13:42:00	70	957.8856	1.38277	
	19-Aug-21 13:43:00	70	957.8856	1.221015	
	19-Aug-21 13:44:00	70	958.4722	1.465213	
	19-Aug-21 13:45:00	70	958.788	1.596705	
	19-Aug-21 13:46:00	70	958.2616	1.406773	
	19-Aug-21 13:47:00	70	959.0888	1.271107	
	19-Aug-21 13:48:00	70	956.0806	1.262758	
	19-Aug-21 13:49:00	70	954.2757	1.606097	
	19-Aug-21 13:50:00	70	955.4489	1.65118	
	19-Aug-21 13:51:00	70	954.9074	1.559136	
	19-Aug-21 13:52:00	70	954.2757	1.730075	1.437042
	19-Aug-21 13:53:00	70	954.2757	1.716926	
	19-Aug-21 13:54:00	70	954.2757	1.704403	
	19-Aug-21 13:55:00	57.333333	954.8773	1.863862	
	19-Aug-21 13:56:00	30	956.938	2.032505	
	19-Aug-21 13:57:00	21	923.0604	0.716264	
	19-Aug-21 13:58:00	0	851.146	-0.38289	
	19-Aug-21 13:59:00	0	802.3242	-0.92149	

Engine:	P-05-06A	Average Dp	
Make:	CAT	Run 1	1.79
Model:	3508	Run 2	1.63
Serial #:	95Y00875	Run 3	1.43
HP:	1184	Avg	1.62

	Date - Time	Governor Position	Inlet Temp	Catalyst DP
	19-Aug-21 07:20:00	0	78.82162	0.730137
	19-Aug-21 07:21:00	0	78.97263	0.719702
	19-Aug-21 07:22:00	0	78.84176	0.706182
	19-Aug-21 07:23:00	0	78.9827	0.713159
	19-Aug-21 07:24:00	0	79.20417	0.708509
	19-Aug-21 07:25:00	0	79.59703	0.709167
	19-Aug-21 07:26:00	1.6666667	79.0231	0.701183
	19-Aug-21 07:27:00	5	78.60015	0.695299
	19-Aug-21 07:28:00	5	97.96626	0.793078
	19-Aug-21 07:29:00	5	139.5099	1.152318
	19-Aug-21 07:30:00	5	178.1334	1.23484
	19-Aug-21 07:31:00	5	205.9921	0.97443
	19-Aug-21 07:32:00	5	226.2082	0.628708
	19-Aug-21 07:33:00	5	240.9561	0.8291
	19-Aug-21 07:34:00	5	251.3422	1.215326
	19-Aug-21 07:35:00	5	258.3286	1.215349
	19-Aug-21 07:36:00	5	264.7288	0.94747
	19-Aug-21 07:37:00	26.666667	271.012	0.827062
	19-Aug-21 07:38:00	70	275.9934	0.71711
	19-Aug-21 07:39:00	70	330.0776	1.616831
	19-Aug-21 07:40:00	70	465.3354	2.027855
	19-Aug-21 07:41:00	70	584.6098	1.75083
	19-Aug-21 07:42:00	70	653.3717	1.972674
	19-Aug-21 07:43:00	70	693.7561	2.365068
	19-Aug-21 07:44:00	70	721.7896	2.314925
	19-Aug-21 07:45:00	70	743.6987	2.413958
	19-Aug-21 07:46:00	70	758.2195	2.340623
	19-Aug-21 07:47:00	70	767.4737	2.299882
	19-Aug-21 07:48:00	70	775.7348	2.317432
	19-Aug-21 07:49:00	70	782.145	2.16951
	19-Aug-21 07:50:00	70	787.8329	2.131902
	19-Aug-21 07:51:00	70	792.3321	2.109756
	19-Aug-21 07:52:00	70	796.0639	2.153631
	19-Aug-21 07:53:00	70	799.5549	2.258514
	19-Aug-21 07:54:00	70	802.6848	2.458669
	19-Aug-21 07:55:00	70	804.1895	2.044987
Run 1	19-Aug-21 07:56:00	70	806.8379	1.994008
	19-Aug-21 07:57:00	70	809.7722	2.161152
	19-Aug-21 07:58:00	70	811.3672	1.929031

	19-Aug-21 07:59:00	70	814.0005	1.737024	
	19-Aug-21 08:00:00	70	815.3247	2.130649	
	19-Aug-21 08:01:00	70	815.3247	2.170763	
	19-Aug-21 08:02:00	70	817.0853	1.870531	
	19-Aug-21 08:03:00	70	818.6201	1.606025	
	19-Aug-21 08:04:00	70	818.3643	1.625874	
	19-Aug-21 08:05:00	70	816.2727	1.62859	
	19-Aug-21 08:06:00	70	815.3247	1.557136	
	19-Aug-21 08:07:00	70	817.1304	1.844414	
	19-Aug-21 08:08:00	70	818.6352	1.882022	
	19-Aug-21 08:09:00	70	818.9361	1.513887	
	19-Aug-21 08:10:00	70	818.9361	1.452462	
	19-Aug-21 08:11:00	70	818.9361	1.538959	1.790158
	19-Aug-21 08:12:00	70	818.9361	1.430733	
	19-Aug-21 08:13:00	70	818.9361	1.379754	
	19-Aug-21 08:14:00	70	820.1098	1.821014	
	19-Aug-21 08:15:00	70	820.1248	2.117695	
	19-Aug-21 08:16:00	70	821.4641	1.758335	
	19-Aug-21 08:17:00	70	822.5475	1.758335	
	19-Aug-21 08:18:00	70	822.5475	1.907093	
	19-Aug-21 08:19:00	70	822.5475	1.707565	
	19-Aug-21 08:20:00	70	822.5475	1.534362	
	19-Aug-21 08:21:00	70	822.5475	1.703178	
	19-Aug-21 08:22:00	70	823.1494	1.430733	
	19-Aug-21 08:23:00	70	823.4503	1.344654	
	19-Aug-21 08:24:00	70	825.2109	1.364711	
	19-Aug-21 08:25:00	70	826.1589	1.537705	
Run 2	19-Aug-21 08:26:00	70	825.572	1.313941	
	19-Aug-21 08:27:00	70	825.256	1.66369	
	19-Aug-21 08:28:00	70	824.6692	1.647393	
	19-Aug-21 08:29:00	70	825.5269	1.599131	
	19-Aug-21 08:30:00	70	826.1589	1.350922	
	19-Aug-21 08:31:00	70	826.1589	1.515141	
	19-Aug-21 08:32:00	70	826.1589	1.882649	
	19-Aug-21 08:33:00	70	826.1589	1.827282	
	19-Aug-21 08:34:00	70	826.1589	1.422376	
	19-Aug-21 08:35:00	70	826.1589	1.548569	
	19-Aug-21 08:36:00	70	826.1589	1.639663	
	19-Aug-21 08:37:00	70	826.1589	1.883693	
	19-Aug-21 08:38:00	70	826.7608	1.915451	
	19-Aug-21 08:39:00	70	827.0617	1.775468	
	19-Aug-21 08:40:00	70	827.6335	1.524751	
	19-Aug-21 08:41:00	70	826.7909	1.637992	1.634257
	19-Aug-21 08:42:00	70	826.1589	1.689388	
	19-Aug-21 08:43:00	70	826.1589	1.550241	
	19-Aug-21 08:44:00	70	826.1589	1.611248	
	19-Aug-21 08:45:00	70	826.1589	1.934463	

	19-Aug-21 08:46:00	70	826.1589	2.031616	
	19-Aug-21 08:47:00	70	826.1589	1.385395	
	19-Aug-21 08:48:00	70	826.1589	1.395424	
	19-Aug-21 08:49:00	70	826.1589	1.361786	
	19-Aug-21 08:50:00	70	827.2423	1.530184	
	19-Aug-21 08:51:00	70	829.1383	1.410467	
	19-Aug-21 08:52:00	70	829.7703	1.335879	
	19-Aug-21 08:53:00	70	829.7703	1.638618	
	19-Aug-21 08:54:00	70	829.7703	1.705058	
	19-Aug-21 08:55:00	70	829.7703	1.457476	
	19-Aug-21 08:56:00	70	829.7703	1.779019	
	19-Aug-21 08:57:00	70	830.9139	1.590773	
	19-Aug-21 08:58:00	70	830.3421	1.312896	
Run 3	19-Aug-21 08:59:00	70	829.7703	1.655542	
	19-Aug-21 09:00:00	70	829.7703	1.459983	
	19-Aug-21 09:01:00	70	829.7703	1.295346	
	19-Aug-21 09:02:00	70	830.944	1.626709	
	19-Aug-21 09:03:00	70	830.4023	1.250635	
	19-Aug-21 09:04:00	70	829.7703	1.531019	
	19-Aug-21 09:05:00	70	829.7703	1.512425	
	19-Aug-21 09:06:00	70	829.7703	1.304539	
	19-Aug-21 09:07:00	70	829.7703	1.365965	
	19-Aug-21 09:08:00	70	828.1	1.525796	
	19-Aug-21 09:09:00	70	828.8223	1.239353	
	19-Aug-21 09:10:00	70	829.1533	1.440344	
	19-Aug-21 09:11:00	70	827.6937	1.671838	
	19-Aug-21 09:12:00	70	826.4749	1.502605	
	19-Aug-21 09:13:00	70	826.1589	1.258783	
	19-Aug-21 09:14:00	70	827.7389	1.242696	1.430224
	19-Aug-21 09:15:00	70	829.4543	1.504485	
	19-Aug-21 09:16:00	70	829.2286	1.788421	
	19-Aug-21 09:17:00	70	828.2956	1.668495	
	19-Aug-21 09:18:00	70	828.5514	1.47816	
	19-Aug-21 09:19:00	70	829.4543	1.414854	
	19-Aug-21 09:20:00	70	829.7703	1.363875	
	19-Aug-21 09:21:00	63.333333	831.5308	1.485682	
	19-Aug-21 09:22:00	36	833.0506	1.901661	
	19-Aug-21 09:23:00	10.000001	826.3394	1.10522	
	19-Aug-21 09:24:00	10.000001	764.7652	0.319225	
	19-Aug-21 09:25:00	10.000001	701.5657	0.162109	
	19-Aug-21 09:26:00	10.000001	655.8816	-0.01924	
	19-Aug-21 09:27:00	10.000001	623.68	0.020037	
	19-Aug-21 09:28:00	10.000001	597.377	-0.07189	
	19-Aug-21 09:29:00	10.000001	573.4064	-0.03554	

Engine:	P-05-06B	Average Dp	
Make:	CAT	Run 1	1.58
Model:	3508	Run 2	1.61
Serial #:	95Y00876	Run 3	1.69
HP:	1184	**Avg**	**1.63**

Date - Time	Governor Position	Inlet Temp	Catalyst DP
18-Aug-21 13:40:00	0	134.9037	0.041178
18-Aug-21 13:41:00	0	134.9037	0.041178
18-Aug-21 13:42:00	0	135.4739	0.041178
18-Aug-21 13:43:00	0	135.2188	0.065562
18-Aug-21 13:44:00	0	135.4589	0.055559
18-Aug-21 13:45:00	0	134.5735	0.075358
18-Aug-21 13:46:00	0	134.6035	0.091197
18-Aug-21 13:47:00	0	133.7632	0.091197
18-Aug-21 13:48:00	1.75	132.5027	0.091197
18-Aug-21 13:49:00	5	132.2026	0.13288
18-Aug-21 13:50:00	5	134.4835	0.185401
18-Aug-21 13:51:00	5	147.5086	0.423201
18-Aug-21 13:52:00	5	167.1362	0.387146
18-Aug-21 13:53:00	15.499999	187.7242	0.325455
18-Aug-21 13:54:00	45.499995	203.0301	0.374641
18-Aug-21 13:55:00	66.749995	219.8367	1.158279
18-Aug-21 13:56:00	70	228.2399	1.266654
18-Aug-21 13:57:00	70	452.7272	1.537593
18-Aug-21 13:58:00	70	631.5967	1.725166
18-Aug-21 13:59:00	70	694.081	1.747675
18-Aug-21 14:00:00	70	734.8368	1.751009
18-Aug-21 14:01:00	70	764.4283	1.920658
18-Aug-21 14:02:00	70	786.712	2.155125
18-Aug-21 14:03:00	70	803.9087	2.205144
18-Aug-21 14:04:00	70	818.8695	2.000273
18-Aug-21 14:05:00	70	833.035	1.87189
18-Aug-21 14:06:00	70	845.0997	2.163253
18-Aug-21 14:07:00	70	853.3229	1.874599
18-Aug-21 14:08:00	70	861.0059	2.0703
18-Aug-21 14:09:00	70	867.3834	2.227028
18-Aug-21 14:10:00	70	872.2152	2.02424
18-Aug-21 14:11:00	70	878.5327	1.77331
18-Aug-21 14:12:00	70	883.4546	1.541761
18-Aug-21 14:13:00	70	887.3561	1.757887
18-Aug-21 14:14:00	70	890.9575	1.707867
18-Aug-21 14:15:00	70	893.2384	1.909821
18-Aug-21 14:16:00	70	895.0391	1.873557
18-Aug-21 14:17:00	70	895.6993	1.8127
18-Aug-21 14:18:00	70	897.455	1.711827

18-Aug-21 14:19:00	70	899.0007	1.716829
18-Aug-21 14:20:00	70	901.5817	1.603869
18-Aug-21 14:21:00	70	903.4574	1.563019
18-Aug-21 14:22:00	70	906.5786	1.345018
18-Aug-21 14:23:00	70	907.1338	1.516751
18-Aug-21 14:24:00	70	906.5035	1.740588
18-Aug-21 14:25:00	70	908.8445	1.653054
18-Aug-21 14:26:00	70	910.105	1.560935
18-Aug-21 14:27:00	70	912.5059	1.708493
18-Aug-21 14:28:00	70	916.1073	1.358357
18-Aug-21 14:29:00	70	917.878	1.117846
18-Aug-21 14:30:00	70	919.9188	1.317924
18-Aug-21 14:31:00	70	922.6649	1.636798
18-Aug-21 14:32:00	70	923.6102	1.636173
18-Aug-21 14:33:00	70	921.8545	1.327303
18-Aug-21 14:34:00	70	920.9092	1.362316
18-Aug-21 14:35:00	70	922.0796	1.259151
18-Aug-21 14:36:00	70	922.1546	1.084709
18-Aug-21 14:37:00	70	923.07	1.298333
18-Aug-21 14:38:00	70	922.7549	1.721831
18-Aug-21 14:39:00	70	922.95	1.506748
18-Aug-21 14:40:00	70	921.8996	1.500078
18-Aug-21 14:41:00	70	921.4944	1.469858
18-Aug-21 14:42:00	70	921.8095	1.33293
18-Aug-21 14:43:00	70	923.5202	1.228306
18-Aug-21 14:44:00	70	924.5106	1.253316
18-Aug-21 14:45:00	70	924.5106	1.415045
18-Aug-21 14:46:00	70	924.5106	1.322093
18-Aug-21 14:47:00	70	924.5106	1.037815
18-Aug-21 14:48:00	70	924.5106	1.347936
18-Aug-21 14:49:00	70	922.7999	1.27374
18-Aug-21 14:50:00	70	922.98	1.421089
18-Aug-21 14:51:00	70	924.2255	1.267071
18-Aug-21 14:52:00	70	923.3401	1.295415
18-Aug-21 14:53:00	70	923.8803	1.635548
18-Aug-21 14:54:00	70	924.5106	1.655972
18-Aug-21 14:55:00	70	925.0808	1.670978
18-Aug-21 14:56:00	70	927.1666	1.611163
18-Aug-21 14:57:00	70	928.1119	1.515709
18-Aug-21 14:58:00	70	928.1119	1.365026
18-Aug-21 14:59:00	70	925.711	1.224971
18-Aug-21 15:00:00	70	924.5106	1.402957
18-Aug-21 15:01:00	70	922.7549	1.370445
18-Aug-21 15:02:00	70	921.2243	1.129101
18-Aug-21 15:03:00	70	920.9092	1.266654
18-Aug-21 15:04:00	70	922.1096	1.191625
18-Aug-21 15:05:00	70	922.7098	1.174952

	18-Aug-21 15:06:00	70	923.9403	1.087835	
	18-Aug-21 15:07:00	70	924.5106	1.159113	
	18-Aug-21 15:08:00	70	924.5106	1.428384	
	18-Aug-21 15:09:00	70	924.5106	1.608454	
	18-Aug-21 15:10:00	70	924.5106	1.646177	
	18-Aug-21 15:11:00	70	924.5106	1.381699	
	18-Aug-21 15:12:00	70	924.5106	1.160363	
	18-Aug-21 15:13:00	70	923.9404	1.338349	
	18-Aug-21 15:14:00	70	923.04	1.640966	
	18-Aug-21 15:15:00	70	922.1246	1.709326	
	18-Aug-21 15:16:00	70	922.95	1.501746	
	18-Aug-21 15:17:00	70	922.4398	1.546138	
	18-Aug-21 15:18:00	70	921.1943	1.578025	
	18-Aug-21 15:19:00	70	920.9092	1.585111	
	18-Aug-21 15:20:00	70	920.9092	1.628045	
	18-Aug-21 15:21:00	70	920.3239	1.706825	
	18-Aug-21 15:22:00	70	920.609	1.683483	
	18-Aug-21 15:23:00	70	920.9092	1.312505	
	18-Aug-21 15:24:00	70	920.9092	1.279784	
	18-Aug-21 15:25:00	70	920.9092	1.445891	
	18-Aug-21 15:26:00	70	920.9092	1.628462	
	18-Aug-21 15:27:00	70	920.9092	1.496744	
	18-Aug-21 15:28:00	70	923.2501	1.586779	
	18-Aug-21 15:29:00	70	923.9554	1.69182	
	18-Aug-21 15:30:00	70	924.1954	1.504872	
	18-Aug-21 15:31:00	70	923.8953	1.395663	
	18-Aug-21 15:32:00	70	923.6102	1.619291	
	18-Aug-21 15:33:00	70	924.2255	1.699114	
	18-Aug-21 15:34:00	70	924.5106	1.497161	
	18-Aug-21 15:35:00	70	926.2662	1.619291	
	18-Aug-21 15:36:00	70	926.0111	1.733502	
Run 1	18-Aug-21 15:37:00	70	927.2116	1.720998	
	18-Aug-21 15:38:00	70	928.1119	1.766849	
	18-Aug-21 15:39:00	70	928.1119	1.596783	
	18-Aug-21 15:40:00	70	928.1119	1.412544	
	18-Aug-21 15:41:00	70	928.1119	1.412961	
	18-Aug-21 15:42:00	70	928.1119	1.339182	
	18-Aug-21 15:43:00	70	928.1119	1.559893	
	18-Aug-21 15:44:00	70	928.1119	1.784564	
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	18-Aug-21 15:50:00	70	941.197	1.360441	
	18-Aug-21 15:51:00	70	944.2733	1.48674	1.575636
	18-Aug-21 15:52:00	70	945.2186	1.725166	

	18-Aug-21 15:53:00	70	945.7888	1.7285	
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	18-Aug-21 15:55:00	70	943.643	1.780396	
	18-Aug-21 15:56:00	70	943.688	1.692445	
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	18-Aug-21 15:59:00	70	946.119	1.702657	
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	18-Aug-21 16:01:00	70	944.4983	1.701823	
	18-Aug-21 16:02:00	70	942.8927	1.450059	
	18-Aug-21 16:03:00	70	942.5176	1.339182	
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	18-Aug-21 16:05:00	70	941.9473	1.807698	
	18-Aug-21 16:06:00	70	942.2024	1.605536	
	18-Aug-21 16:07:00	70	944.9785	1.799361	
	18-Aug-21 16:08:00	70	946.119	1.941917	
Run 2	18-Aug-21 16:09:00	70	946.119	1.751843	
	18-Aug-21 16:10:00	70	946.119	1.60762	
	18-Aug-21 16:11:00	70	946.119	1.718497	
	18-Aug-21 16:12:00	70	947.2594	1.380032	
	18-Aug-21 16:13:00	70	949.0901	1.07658	
	18-Aug-21 16:14:00	70	949.7203	1.608454	
	18-Aug-21 16:15:00	70	949.7203	1.804363	
	18-Aug-21 16:16:00	70	947.4395	1.591364	
	18-Aug-21 16:17:00	70	946.119	1.666601	
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	18-Aug-21 16:29:00	70	953.3218	1.76143	
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	18-Aug-21 16:32:00	70	953.3218	1.673062	
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	18-Aug-21 16:34:00	70	953.3218	1.647636	
	18-Aug-21 16:35:00	70	954.3422	1.744757	
	18-Aug-21 16:36:00	70	954.5672	1.704116	
	18-Aug-21 16:37:00	70	953.6369	1.373571	
	18-Aug-21 16:38:00	70	953.3218	1.424216	
	18-Aug-21 16:39:00	70	953.3218	1.464231	

	18-Aug-21 16:40:00	70	953.3218	1.507164	
	18-Aug-21 16:41:00	70	953.3218	1.613039	
Run 3	18-Aug-21 16:42:00	70	953.892	1.523004	
	18-Aug-21 16:43:00	70	954.7173	1.557392	
	18-Aug-21 16:44:00	70	956.2629	1.594282	
	18-Aug-21 16:45:00	70	956.9232	1.753719	
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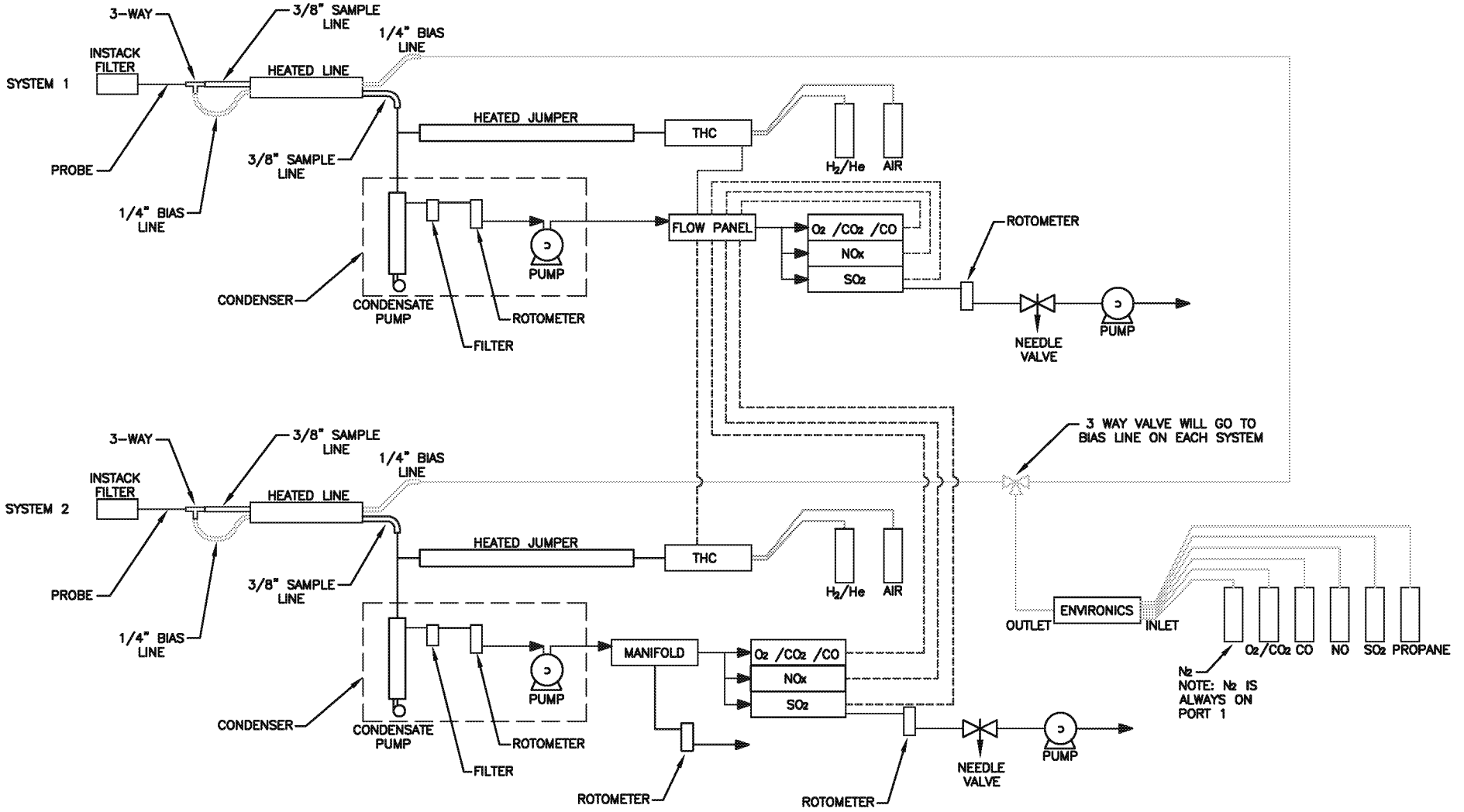
	18-Aug-21 16:47:00	70	956.9232	1.816868	
	18-Aug-21 16:48:00	70	956.9232	1.628462	
	18-Aug-21 16:49:00	70	956.9232	1.437346	
	18-Aug-21 16:50:00	70	956.9232	1.62346	
	18-Aug-21 16:51:00	70	956.9232	1.801862	
	18-Aug-21 16:52:00	70	956.9232	1.831457	
	18-Aug-21 16:53:00	70	956.9232	1.736837	
	18-Aug-21 16:54:00	70	956.9232	1.484656	
	18-Aug-21 16:55:00	70	956.9232	1.754344	
	18-Aug-21 16:56:00	70	957.5234	1.808532	
	18-Aug-21 16:57:00	70	959.6242	1.775185	1.691989
	18-Aug-21 16:58:00	70	958.7238	1.816868	
	18-Aug-21 16:59:00	70	959.084	1.768099	
	18-Aug-21 17:00:00	47.833333	958.4838	1.900234	
	18-Aug-21 17:01:00	0	953.2617	0.661419	
	18-Aug-21 17:02:00	0	903.3524	-0.28395	
	18-Aug-21 17:03:00	0	832.3147	-0.47965	
	18-Aug-21 17:04:00	0	795.1003	-0.49653	

Appendix E

2 SYSTEMS, 2 SOURCES



COLOR CODE

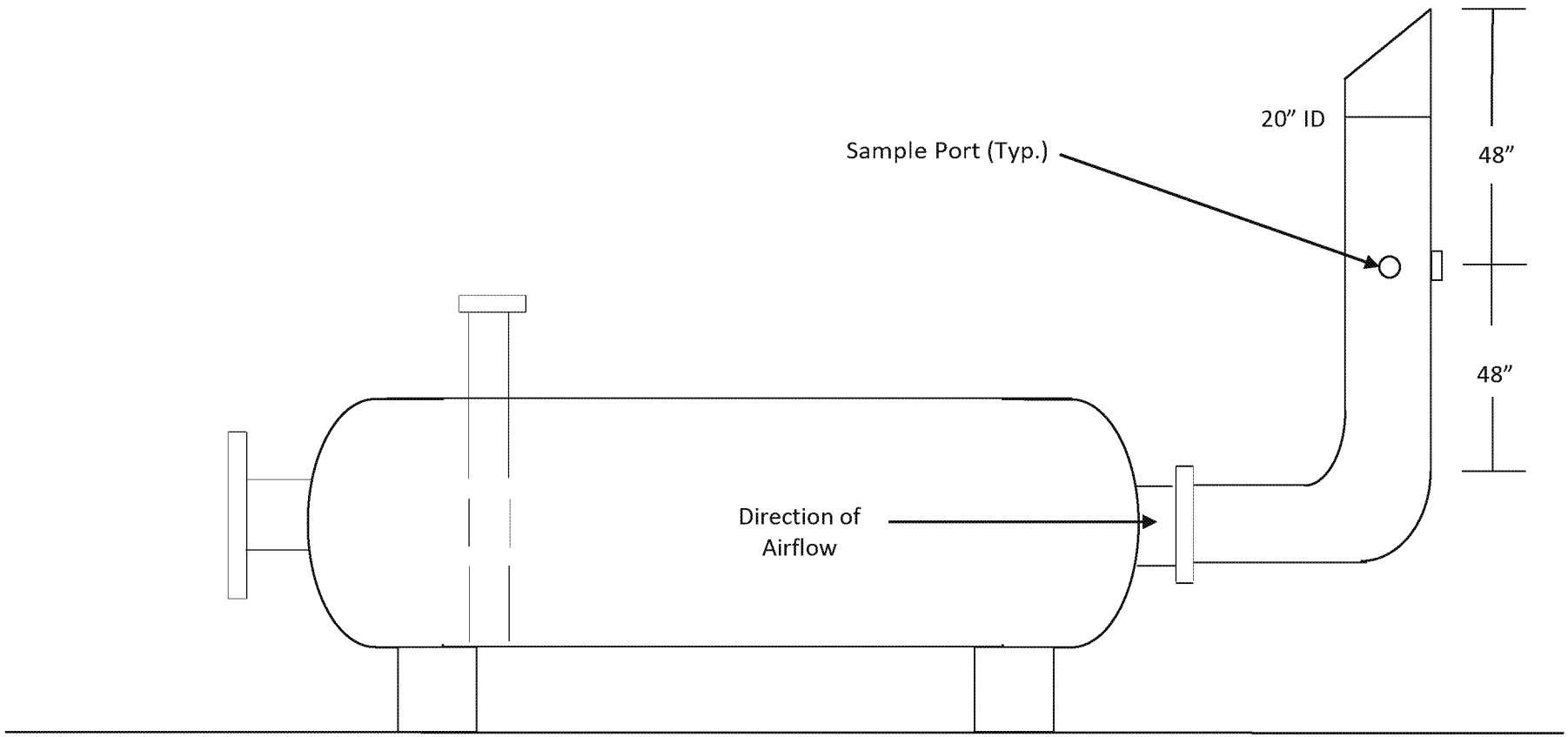
BLUE – STACK GAS

GREEN– CALIBRATION GAS

RED – INSTRUMENT SIGNAL OUTPUT (0–10V)

ORANGE – FUEL/AIR

NOTES: FLOW PANEL ROTOMETER CHANNEL (SYSTEM 1)
1= NOX
2= ANY INSTRUMENT
3= ANY INSTRUMENT
4= ANY INSTRUMENT
5= ANY INSTRUMENT
6= OUTLET (SHOULD ALWAYS BE OPEN)



Alliance
SOURCE TESTING

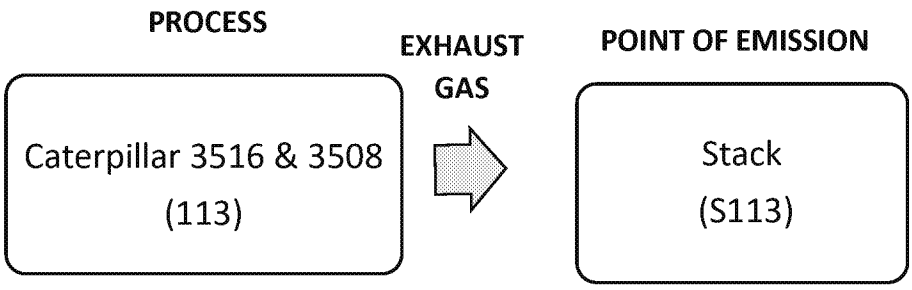
214 Central Circle SW
Decatur, AL 35603
Phone: (256) 351-0121

Compressor Engine Stack Illustration

DRAWN BY:	CADFILE:	SCALE:
AST/la	NA	N.T.S.

PROCESS FLOW DIAGRAMS FOR ENGINE SOURCES

DIESEL FUEL



Appendix F

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

VIA ELECTRONIC MAIL

Mr. Kevin Smith
Environmental Compliance Specialist
Sunoco Partners
Marketing & Terminals, L.P.
100 Green Street
Marcus Hook, PA 19061
kevin.smith2@energytransfer.com

RE: Alternative Testing Approval for Six Flood Pump Engines at SPMT Marcus Hook

Dear Mr. Smith:

The United States Environmental Protection Agency Region 3 ("EPA" or "R3" issued an approval for an alternative testing scenario to Sunoco Partners Marketing & Terminals, L.P. ("SPMT") on August 1, 2013 and February 20, 2018 for six reciprocating internal combustion ("RICE") compression ignition ("CI") engines at the Marcus Hook Industrial Complex, located in Marcus Hook, PA ("facility" or "site"). The engines are used to power flood pumps that move large quantities of water at the facility during heavy rain events, preventing flooding of the facility and allowing access to pipe racks and cable trays at the site. EPA is in receipt of a letter dated December 17, 2020, requesting approval to complete testing on the engines, in the manner that was previously approved in 2013 and 2018.

Each of the six engines is subject to 40 C.F.R. Part 63 Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines ("Subpart 4Z" or "RICE Rule"), because each is a stationary RICE located at a major source of hazardous air pollutants (HAPs). Furthermore, even though the six engines operate only during heavy rains, they do not meet the definition of an "emergency stationary RICE" in accordance with an October 12, 2011 letter issued by EPA Region 1 Air Programs Branch to the Massachusetts Water Resources Authority. To comply with the emissions standards in Subpart 4Z, Sunoco installed pollution reduction catalyst on each unit prior to the May 3, 2013 compliance date found at § 63.6595(a) for existing CI RICE.

The six engines were manufactured by Caterpillar, installed in 1994, and are arranged as three sets of two identical units, summarized below:

Designation	Horsepower (hp)/each engine	Pumping Capacity Gallons per Minute (GPM)
MP05-02 A & B	1745	23,500
MP05-04 A & B	2294	32,000
MP05-06 A & B	1184	42,650

In accordance with the two R3-issued approvals mentioned above, SPMT completed testing on 2A, 4B, and 6A on September 30, 2015; completed the testing on engines 2B and 6B on November 16, 2018; and completed the testing on engine 4A on December 20, 2018. All engines have demonstrated compliance with the emission limits in Subpart 4Z. SPMT now proposes to complete testing on all 6 engines during the

summer of 2021, as proposed in its December 2020 letter. A test protocol has been submitted to PADEP because SPMT has secured a different testing contractor than the previous test programs.

Subpart 4Z at § 63.6615 and Table 3 requires Sunoco to complete testing on the engines every three years (or 8760 hours of operation). SPMT provided operational info in May 2021 demonstrating that no engine exceeded 500 hours of operation per year, so testing every 3 years is the appropriate compliance schedule.

Due to the sporadic and unpredictable nature of the operation of the engines based on rainfall, EPA's previous approvals allowed Sunoco to implement the following testing protocol alternatives:

1. EPA will allow notification for the performance test to take place by phone and email as soon as Sunoco is aware of the possibility of completing a test, rather than the 60-day written notification of intent to test required at § 63.6645(g) and by the requirements of the General Provisions at § 63.7.
2. EPA had previously approved testing of one engine from each identical set per performance test event; however, the December 2020 letter requests approval to test all six units. This increase in the number of units tested in one event is approved.
3. If after one year of the date of this letter there have not been enough rain events to complete testing on each engine, SPMT shall contact EPA Region 3 to discuss continuing the compliance period.
4. EPA will allow shortened test runs of 15 minutes each, rather than the three (1) hour runs required in the rule. Sunoco should perform three 15- minute test runs at 90% (or greater) of the design load for each engine being tested.

EPA Region 3 approves SPMT's request as outlined above in Items 1-4 for all six engine units at the Marcus Hook Terminal. Please be aware that while the rule specifies a 3-year testing schedule, Sunoco may complete its test at any time within that 3-year window, meaning it can complete its test upon receipt of this approval.

The final test reports will be submitted to EPA and Pennsylvania Department of Environmental Protection ("PADEP") as required by Subpart 4Z, the General Provisions of 40 C.F.R. Part 63, PADEP's rules and Sunoco's Title V Permit. Nothing in this approval alters the rules and requirements of Subpart 4Z as they apply to the Marcus Hook facility or any other SPMT site, for all other engines at this or other sites.

If you have questions or comments regarding this letter, please contact Erin Willard at (215) 814-2152 or by email at Willard.ErinM@epa.gov.

Sincerely,

Karen Melvin, Director
Enforcement and Compliance Assurance Division

SUNOCO PARTNERS
MARKETING & TERMINALS
An ENERGY TRANSFER Partnership

Via First Class & Electronic Mail

December 17, 2020

Erin Willard
Environmental Scientist
US EPA Region III
Office of Air Enforcement and Compliance Assistance (3AP20)
1650 Arch Street
Philadelphia, PA 19103

Re: Sunoco Partners Marketing & Terminals L.P. – Marcus Hook Industrial Complex
Title V Operating Permit 23-00119
Request for an Alternate Testing Plan for 40 CFR Part 63, Subpart ZZZZ

Dear Ms. Willard,

Sunoco Partners Marketing & Terminals L.P. (SPMT) has six (6) diesel engines located at its Marcus Hook Industrial Complex and subject to 40 CFR Part 63, Subpart ZZZZ. Those six diesel engines power six water pumps that are used only when a significant rain event occurs in the facility. The pumps were installed in 1994. As they were subject to Subpart ZZZZ as existing engines located at a major facility and were greater than 500 HP, controls were installed under Pennsylvania Plan Approval 23-0001AD and later incorporated into Tile V Operating Permit 23-00119. The Subpart ZZZZ regulation has specific requirements for notification and testing at full load that are not reasonably achievable due to uncertainty of rainwater. In order to achieve the load conditions required of the regulation, a significant rainfall must occur. Also, the equipment cannot normally run fully loaded for the length of time to do full testing (three, 1-hour runs typically require 4 hours per source). As the amount of water subsides in the facility, the pumps are shutdown as they cannot operate without water.

Below is a summary of the diesel engine pump sets:

Description	Horsepower of Diesel	Standard Capacity
MP05-02 A & B	1745	23,500 GPM
MP05-04 A&B	2294	32,000 GPM
MP05-06 A & B	1184	42,650 GPM

SPMT previously requested alternate testing plans in letters to the EPA dated July 8, 2013 and January 22, 2018. The EPA approved of the alternate testing plans in letters to SPMT dated August 1, 2013 and February 20, 2018. SPMT completed the initial performance testing of engines 2A, 4B, and 6A on September 30, 2015; completed the testing on engines 2B and 6B on November 16, 2018; and completed the testing on engine 4A on December 20, 2018.

Engines 2A, 4B, and 6A are due to be retested in 2021; however, SPMT is proposing to test all six engines in 2021 to reestablish the operating limitations for the pressure drop across the catalyst on all the engines. SPMT kindly requests an alternative testing plan to demonstrate compliance with

the 23 ppm of CO at 15% O2 (40 CFR 63 ZZZZ Table 2C). SPMT intends to monitor the forecast for significant rain, mobilize our testing contractors, and stage testing equipment near the pumps in preparation for the test.

- Testing of CO in 15 minute runs verses the three 1-hour runs (1-hour run requirement is found in Table 4 item #5 of the standard. Per 40 CFR 63.6630, 15-minute requirement allowed for other equipment).
- 60-day notification of intent to test requirement waived (63.6645(g)).
- Waiver of stratification requirement Method 1 (this was granted for internal combustion engine test for Reference Method 7E). See attached.
- Compliance standard of 23 ppm CO at 15% excess O2 is the applicable standard.

Submittal of testing protocols and final test reports to the appropriate agencies will be compliant with the State and Federal rules.

Please feel free to contact me by email at kevin.smith2@energytransfer.com or by telephone at 610-859-1279.

Sincerely,

Kevin Smith

Kevin Smith
Specialist – Environmental Compliance

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JUL 27 2011

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Ryan O'Dea
Alliance Source Testing
8020 Counts Massie Road
N. Little Rock, Arkansas 72113

Dear Mr. O'Dea:

In your July 21, 2011 correspondence, you asked for a waiver of the stratification test required in Method 7E (40 CFR 60, Appendix A) when testing reciprocating internal combustion engines. You noted the difficulty in evaluating emission profiles where gas concentrations are constantly varying and exhausts are too small to effectively traverse. These conditions render a stratification test ineffective and inappropriate. Under Federal New Source Performance Standards (40 CFR 60 Subparts IIII and JJJJ), Methods 1 or 1A and Method 7E are required for selecting sampling points and measuring nitrogen oxides (NO_x). Method 7E requires a stratification check before each test.

We agree that a stratification test does not enhance representative sampling and is not appropriate under the noted conditions. We are currently revising Subparts IIII and JJJJ to delete the Method 1 or 1A requirement for sampling point selection. In its place we will specify single-point sampling at the centroid of the exhaust. This new requirement will preclude the need for a stratification test with Method 7E.

We grant your request for a waiver of the stratification test whenever Method 7E is used to determine NO_x emissions from Federally-regulated engines. Single-point sampling at the centroid of the exhaust is adequate. This waiver also applies to carbon monoxide testing. We will be posting this approval on our website at http://www.epa.gov/ttn/emc/approalt.html for use by other interested parties with similar situations.

If you have questions or would like to discuss the matter further, please call Foston Curtis at (919) 541-1063 or you may email him at curtis.foston@epa.gov.

Sincerely,

Conniesue B. Oldham, Ph.D., Group Leader
Measurements Technology Group

cc: Melanie King, OAQPS/SPPD/ESD (D243-01)

Alliance
SOURCE TESTING

January 28, 2021

Pennsylvania Department of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown, PA 19401

Pennsylvania Department of Environmental Protection
Attn: PSIMS Administrator
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101

RE: Compliance Testing Protocol
Sunoco Partners Marketing & Terminals – Marcus Hook, PA
PFID: 757998
PADEP Title V Operating Permit No. 23-00119

To Whom it May Concern,

Alliance Source Testing, LLC (AST) is submitting the attached test protocol for upcoming testing at the Sunoco Partners Marketing and Terminals LP (Sunoco) Marcus Hook Industrial Complex located in Marcus Hook, Delaware County, Pennsylvania.

Testing will include determining the concentrations of oxygen (O_2) and carbon monoxide (CO) from the outlets of six (6) diesel fired engine pumps to demonstrate compliance with the facility's Pennsylvania Department of Environmental Protection (PADEP) Title V Operating Permit (TVOP) 23-00119 and 40 CFR 63, Subpart ZZZZ.

Tentative Test Date	Source Description / ID	Control System Description / ID	Applicability
TBD	P-05-02A / 113	Diesel Engine Pumps	PADEP TVOP 23-00119 & 40 CFR 63, Subpart ZZZZ
	P-05-02B / 113		
	P-05-04A / 113		
	P-05-04B / 113		
	P-05-06A / 113		
	P-05-06B / 113		

To the best of our knowledge, the state and federal regulations, operating permits, or plan approvals applicable to each source or control device to be tested have been reviewed and all testing requirements therein have been incorporated into this test plan.

Sincerely,

Adam Robinson
Alliance Source Testing, LLC

1/28/21
Date

Kevin Smith
Sunoco Partners Marketing and Terminals LP

Date

TEST PROTOCOL 2021-0417 & 2021-0418

1.0 Source Operator Information

Source Owner/Operator:	Sunoco Partners Marketing and Terminals LP
Contact Name:	Kevin Smith – Energy Transfer
Title:	Specialist – Environmental Compliance
Mailing Address:	100 Green Street Marcus Hook Borough, Pennsylvania 19061-4800
Telephone:	(610) 859-1279
Email:	kevin.smith2@energytransfer.com

2.0 Test Firm Information

Firm Name:	Alliance Source Testing, LLC
Contact Name:	Adam Robinson – Project Manager
Mailing Address:	1201 Parkway View Drive Pittsburgh, PA 15205
Telephone:	(412) 668-4040
Email:	adam.robinson@stacktest.com
PADEP Registration No.	02-05674

3.0 Test Location Information

Sunoco / Marcus Hook Industrial Complex

100 Green Street

Marcus Hook, PA 19061-4800

4.0 Source Information

Sunoco owns and operates a refined petroleum product and crude oil storage and transfer terminal at its Marcus Hook Industrial Complex located in Marcus Hook, Pennsylvania. The Marcus Hook Industrial Complex operates six (6) diesel engines (Source ID 113) (three pair of engines) to power six water pumps utilized to remove surface water from the Marcus Hook facility roadways to allow access to pipe racks and cable trays during a significant rainfall event. As the amount of water subsides the pumps are shut-down as the engines are no longer required to drain the area. It should be noted that maximum load for the engines are only achieved during these events and it is not feasible to recirculate the surface water through the discharge pump as when the surface water hears it may overheat the discharge pump resulting in damage.

The P-05-2A and P-05-2B engines are identical Caterpillar Model 3512 sixteen-cylinder, compression ignition engines. The units are fired with No. 2 fuel oil and have a maximum rated horsepower of 1,745 HP at 1,800 RPM. Each engine is directly coupled to a facility water pump with a maximum rated pump capacity of 23,500 gallons per minute (gpm). Each engine is equipped with an oxidation catalyst for CO control.

The P-05-4A and P-05-4B engines are identical Caterpillar Model 3516 sixteen -cylinder, compression ignition engines. The units are fired with No. 2 fuel oil and have a maximum rated horsepower of 2,294 HP at 1,800 RPM. Each engine is directly coupled to a facility water pump with a maximum rated pump capacity of 32,000 gpm. Each engine is equipped with an oxidation catalyst for CO control.

The P-05-6A and P-05-6B engines are identical Caterpillar 3508 sixteen-cylinder, compression ignition engines. The units are fired with No. 2 fuel oil and have a maximum rated horsepower of 1,184 HP at 1,800 RPM. Each engine is directly coupled to a facility water pump with a maximum rated pump capacity of 42,650 gpm. Each engine is equipped with an oxidation catalyst for CO control.

5.0 Air Permit Information

PADEP Permit: 23-00119

PFID: 757998

6.0 Test Program Objective

Testing will include determining the concentrations of oxygen (O_2) and carbon monoxide (CO) from the outlets of six (6) diesel fired engines to demonstrate compliance with the facility's Pennsylvania Department of Environmental Protection (PADEP) Title V Operating Permit 23-00119 and 40 CFR 63, Subpart ZZZZ.

7.0 Recorded Process Parameters & Target Ranges

Sunoco personnel will record the following process operating/control system parameters at least every 1minute during the testing. Please note, each engine operates at a reduced load level and testing within 90 percent of the maximum rated capacity is not feasible. Testing will be conducted while the engines are operated within 10 percent of the maximum normal operating condition and approximately 55 percent of the maximum rated capacity as maintained by the facility personnel. The typical maximum normal operating condition is 60 percent of the rated capacity.

Parameter	Min. Operating Condition	Target Test Operating Condition	Max. Operating Condition
Engine Load / Governor Position (%)	50%	55%	60%
Pressure Drop Across the Catalyst	Variable with load	Variable with load	Variable with Load
Catalyst Inlet Temperature, °F	450 Deg F	Variable	1,350 Deg F

8.0 Limits

Emission limits for each pollutant are below.

Source	Pollutant	Pollutant
P-05-2A and P-05-2B	CO – 23 ppmvd @ 15% O_2	PADEP Permit
	CO – 23 ppmvd @ 15% O_2	40 CFR 63, Subpart ZZZZ
P-05-4A and P-05-4B	CO – 23 ppmvd @ 15% O_2	PADEP Permit
	CO – 23 ppmvd @ 15% O_2	40 CFR 63, Subpart ZZZZ
P-05-6A and P-05-6B	CO – 23 ppmvd @ 15% O_2	PADEP Permit
	CO – 23 ppmvd @ 15% O_2	40 CFR 63, Subpart ZZZZ

9.0 Testing Methodology

Due to the complex nature of predicting the variability of storm events and predicting the actual run time of each engine, the United States Environmental Protection Agency (EPA) has previously granted a proposed alternative test plan to Sunoco relaxing the required three 1-hour test runs to three 15-minute test runs and waiver of the 60-day notification of intent to test requirement. Sunoco submitted a Request for an Alternate Testing Plan for 40 CFR Part 63, Subpart ZZZZ to the EPA on December 17, 2020, for this test. A copy of this request letter is included as Attachment C. A copy of EPA's approval letter will be submitted with the Final Test Report. Additional, Sunoco expects the testing to occur over two separate rain events, and testing three engines per rain event.

Source / Location	Parameter	Reference Test Method	No of Test Runs / Test Run Duration	Reporting Units
Engine Exhausts	Sample Point Determination	1	--	--
	Oxygen	3A	3 / 15 minutes	%
	Carbon Monoxide	10		ppmvd @ 15% O_2 g/hp-hr
--	Gas Dilution System Certification	U.S. EPA 205	--	--

9.1 U.S. EPA Reference Test Method 1 – Sample Point Determination

The sampling locations will be selected in accordance with U.S. EPA Reference Test Method 1. The upstream and downstream distances will be equated into equivalent diameters and compared to the criteria in U.S. EPA Reference Test Method.

9.2 U.S. EPA Reference Test Method 3A – Oxygen

The oxygen (O_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless steel probe, heated Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. The quality control measures are described in Section 9.5.

9.3 U.S. EPA Reference Test Method 10 – Carbon Monoxide

The carbon monoxide (CO) testing will be conducted in accordance with U.S. EPA Reference Test Method 10. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless steel probe, heated Teflon sample line(s), gas conditioning system, and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the gas. The quality control measures are described in Section 9.5.

9.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check will be conducted in accordance with U.S. EPA Reference Method 205. Multiple dilution rates and total gas flow rates will be utilized to force the dilution system to perform two dilutions on each mass flow controller. The diluted calibration gases will be sent directly to the analyzer, and the analyzer response recorded in an electronic field data sheet. The analyzer response must agree within 2% of the actual diluted gas concentration. A second Protocol 1 calibration gas, with a cylinder concentration within 10% of one of the gas divider settings described above, will be introduced directly to the analyzer, and the analyzer response recorded in an electronic field data sheet. The cylinder concentration and the analyzer response must agree within 2%. These steps will be repeated three (3) times.

9.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Methods 3A, 7E and 10

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High Level gas. For the Calibration Error Test, Low, Mid, and High Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

High or Mid Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5 ppm (whichever was less restrictive) will be recorded. If the Low Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5 ppm (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

High or Mid Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference or the data is invalidated and the Calibration Error Test and System Bias must be repeated.

The Drift between pre- and post-run System Bias must be within 3% of the Calibration Span or 0.5 ppmv absolute difference or the Calibration Error Test and System Bias must be repeated.

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.5 ppm (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 1.0 ppm from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differs by more than 10% or 1.0 ppm from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

An NO2 – NO converter check will be performed on the analyzer prior to initiating testing. An approximately 50 ppm nitrogen dioxide cylinder gas will be introduced directly to the NOx analyzer and the instrument response will be recorded in an electronic data sheet. The instrument response must be within +/- 10 percent of the cylinder concentration.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the AST server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at AST's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

10.0 Testing Schedule

Date	Planned Activity
Day 1	Equipment Setup & Pretest QC Checks
Day 2	Conduct Compliance Testing on Three (3) Engines
Day 3	Contingency Day (if needed)

11.0 Testing Equipment Information

Instrumental Emission Monitors:

- Servomex 4900 O2/CO/CO2 Monitor - O2 paramagnetic; CO – NDIR/Gas Correlation
- Environics Series 4040 Calibration Gas Dilution System
  - APEX Analytical /Environmental Supply Meter Console

12.0 Instrumentation Summary

Parameter	Analyzer	Operating Principle	Approximate Span	Calibration gases (% of span)
O_2	CAI or Servomex	Paramegnetic or infrared	20%	0, 40-60, 100
CO	CAI or Servomex	Paramegnetic or infrared	50 ppm	0, 40-60, 100

13.0 Test Program Procedure

Equipment Setup Day – QA Checks – Typically conducted on the day before compliance testing is conducted

- EPA Method 205 - Gas Dilution System QA check

Test Day

- Calibrate Instruments directly
  - Introduce zero, mid and high range calibration gases directly to instrument and allow approximately 30 seconds for readings to stabilize. Record instrument readings.
- Check for sample bias through the sampling system.
  - Introduce calibration gases to the sample probe and through the sampling system. Record response time and allow approximately 30 seconds for instruments to stabilize. Record instrument readings.
- Initiate Run 1 sampling.
- Record engine diagnostics for Run 1.
- Following Run 1
  - Instrumental data is downloaded from the data collection system and entered into calculation sheet.
  - The instrumental sampling system will be checked using zero and mid range gas introduced to the sampling system at the sample probe.
- The same procedures will be followed before, during and after Runs 2 and 3.

Examples of field data sheets and field/laboratory calibration sheets are provided in Appendix B.

14.0 Test Report(s)

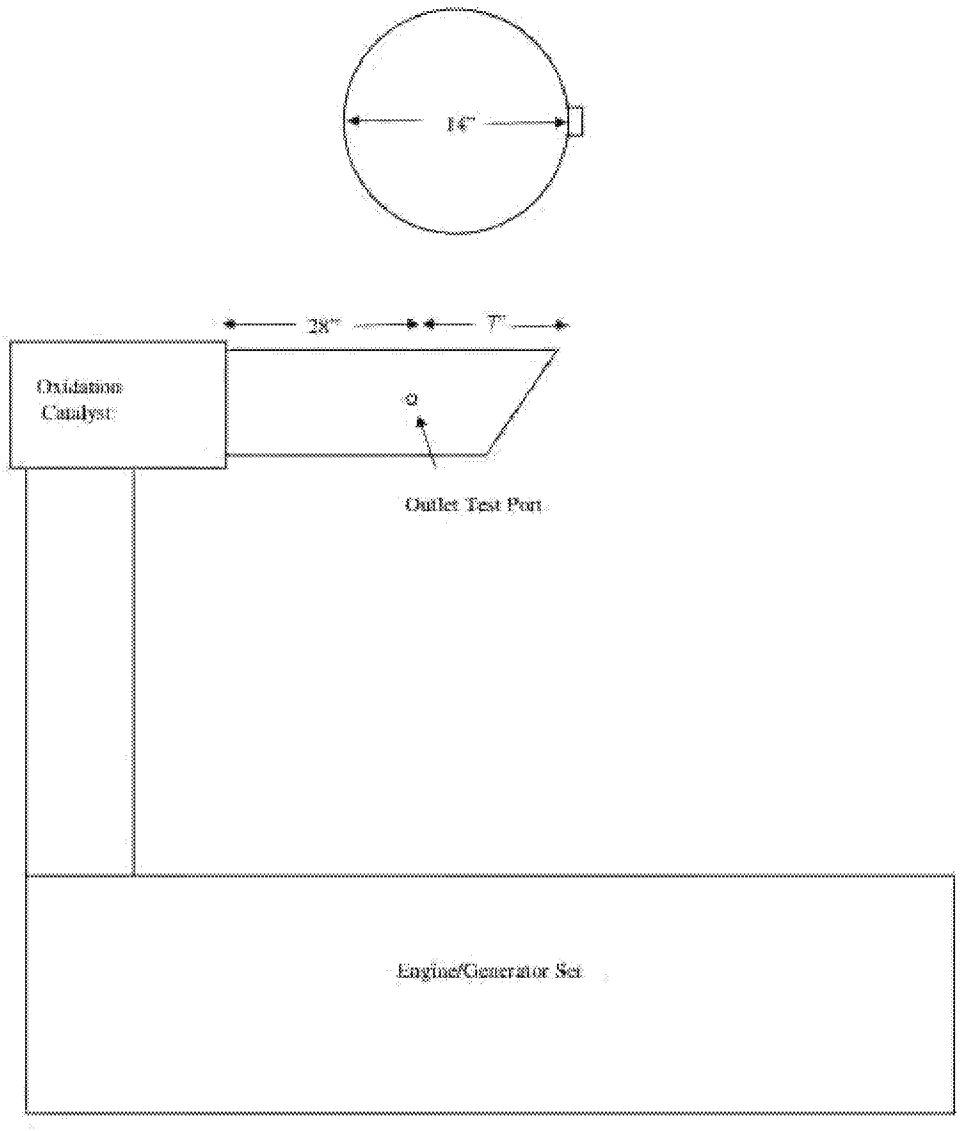
The final test report(s) submitted to the AMS for review will include the following information:

- *Test Results Summary (TRS) Table* – Summary table with results in comparison to applicable limit will be noted.
- *Introduction* – Brief discussion of project scope of work and activities.
- *Certification Statement* – Signed document stating that to the best of our knowledge and abilities, all information, facts and test data are correct. Data presented in the report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections on the test report.
- *Results and Discussion* – A summary of emission and process operational data with comparison to regulatory requirements along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Summary of Calculations* – Sample calculations for one complete test run and complete calculation tables for the entire test.
- *Field Data* – Copies of actual handwritten/electronic field data sheets and/or analyzer data.
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control Data* – Process descriptions, operating parameters, control system data, data used for inlet mass balance calculations and inlet flow meter calibration records (as provided by Sunoco) to support the test results.
- *Illustrations* – Drawing and/or diagrams of the emission point and sampling system(s) will be included

The report will be submitted within 60 days of the date of test completion.

Appendix A

Appendix A: Typical Stack Dimensions for the Engine/Generator Sets at Marcus Hook Industrial Complex



Appendix B

Appendix B: Example Field Data Sheets

Location -
Source --
Project No. --

Parameter	O_2 - Outlet	CO - Outlet
Make	--	--
Model	--	--
S/N		
Operating Range		
Cylinder ID Low Mid High	NA	NA

Alliance SOURCE TESTING

Calibration Data

Location: -
Source: --
Project No.: --
Date:

Parameter	O_2 - Outlet	CO - Outlet
Expected Average Concentration		
Span Between		
Low		
High		
Desired Span		
Low Range Gas		
Low		
High		
Mid Range Gas		
Low		
High		
High Range Gas		
Low		
High		
Actual Concentration (% or ppm)		
Zero		
Low		
Mid		
High		
Response Time (seconds)		
Instrument Response (% or ppm)		
Zero		
Low		
Mid		
High		
Performance (% of Span or Cal. Gas Conc.)		
Zero		
Low		
Mid		
High		
Status		
Zero		
Low		
Mid		
High		

Alliance SOURCE TESTING

Bias/Drift Determinations

Location: -
Source: --
Project No.: --

Parameter	O_2 - Outlet	CO - Outlet
Run 1 Date --		
Span Value	-	-
Instrument Zero Cal Response	-	-
Instrument Mid Cal Response	-	-
Pretest System Zero Response	-	-
Posttest System Zero Response	-	-
Pretest System Mid Response	-	-
Posttest System Mid Response	-	-
Bias (%)		
Pretest Zero	-	-
Posttest Zero	-	-
Pretest Span	-	-
Posttest Span	-	-
Drift (%)		
Zero	-	-
Mid	-	-
Run 2 Date --		
Span Value	-	-
Instrument Zero Cal Response	-	-
Instrument Mid Cal Response	-	-
Pretest System Zero Response	-	-
Posttest System Zero Response		
Pretest System Mid Response		
Posttest System Mid Response		
Bias (%)		
Pretest Zero	-	-
Posttest Zero	-	-
Pretest Span	-	-
Posttest Span	-	-
Drift (%)		
Zero	-	-
Mid	-	-
Run 3 Date --		
Span Value	-	-
Instrument Zero Cal Response	-	-
Instrument Mid Cal Response	-	-
Pretest System Zero Response		
Posttest System Zero Response		
Pretest System Mid Response		
Posttest System Mid Response		
Bias (%)		
Pretest Zero	-	-
Posttest Zero	-	-
Pretest Span	-	-
Posttest Span	-	-
Drift (%)		
Zero	-	-
Mid	-	-

Location: -
Source: --
Project No.: --
Date: -

Time	O_2 - Outlet	CO - Outlet
Unit	% dry	ppmvd
Status	Valid	Valid

-
-
-
-
-
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-
-

Parameter	O_2 - Outlet	CO - Outlet
Uncorrected Run Average (C_{obs})	-	-
Cal Gas Concentration (C_{MA})		
Pretest System Zero Response		
Posttest System Zero Response		
Average Zero Response (Co)		
Pretest System Cal Response		
Posttest System Cal Response		
Average Cal Response (C_M)		
Corrected Run Average (Corr)	-	-

Location -
Source --
Project No. --

Run Number		Run 1	Run 2	Run 3	Average
Date					--
Start Time					--
Stop Time					--
Turbine Data					
Engine Manufacturer					
Engine Model					
Engine Serial Number					
Engine Hour Meter Reading	EMR				
Engine Speed, RPM	ES				
Suction Pressure, psig	SP				
Discharge Pressure, psig	DiT				
Engine Brake Work, HP	EBW				
Maximum Engine Brake Work, HP	MaxEBW				
Engine Load, %	EL				
Fuel Heating Value, Btu/scf	F_{HV}				
Fuel Factor, dscf/MMBtu	F_{Factor}				
Fuel Rate, scfh	F_R				
Input Data - Outlet					
Ambient Temperature, °F	T_{Amb}				
Calculated Data - Outlet					
O2 Concentration, % dry	C_{O2}				
CO Concentration, ppmvd	C_{CO}				
CO Concentration, ppmvd @ 15% O2	C_{COc15}				
CO Emission Factor, g/HP-hr	EF_{CO}				
CO Emission Rate, lb/hr	ER_{CO}				
CO Emission Rate, ton/yr	ER_{COTPY}				

Alliance SOURCE TESTING

QA Data
Stratification Check

Location: _____
Source: _____
Project No.: _____
Date: _____

Traverse Point	Time	O_2 (%)
A-1		
2		
3		
Average		
Status		Single

Alliance
SOURCE TESTING

Location -
Source --
Project No. --

Run Number	Run 1	Run 2	Run 3
Date	--	--	--
Start Time	--	--	--
Stop Time	--	--	--
Engine Operational Data			
Generator Output, Hz (Gen OP)			
Time, 0 min			
Time, 15 min			
Time, 30 min			
Time, 45 min			
Time, 60 min			
Average	--	--	--
Pre Catalyst Temperature, °F (PreT)			
Time, 0 min			
Time, 15 min			
Time, 30 min			
Time, 45 min			
Time, 60 min			
Average	--	--	--
Catalyst Differential Pressure, in WC (ΔP)			
Time, 0 min			
Time, 15 min			
Time, 30 min			
Time, 45 min			
Time, 60 min			
Average	--	--	--
Engine Speed, RPM (ES)			
Time, 0 min			
Time, 15 min			
Time, 30 min			
Average	--	--	--
Engine Brake Work, HP (EBW)			
Time, 0 min			
Time, 15 min			
Time, 30 min			
Average	--	--	--
Engine Load, % (EL)			
Time, 0 min			
Time, 15 min			
Time, 30 min			
Average	--	--	--

Location: -
Source: --
Project No.: --
Run No./Method Run 1 Outlet/ Method 10

Carbon Monoxide Concentration (C_{CO}), ppmvd

$$C_{CO} = (C_{obs} - C_o) \times \left(\frac{C_{MA}}{(C_M - C_o)} \right)$$

where,

C_{obs}	--	= average analyzer value during test, ppmvd
C_o	--	= average of pretest & posttest zero responses, ppmvd
C_{MA}	--	= actual concentration of calibration gas, ppmvd
C_M	--	= average of pretest & posttest calibration responses, ppmvd
C_{CO}	--	= CO concentration, ppmvd

Carbon Monoxide Concentration @ 15% Oxygen (C_{COc15}), ppmvd @ 15% O2

$$C_{COc\text{-}15} = C_{CO} \times \frac{20.9 - 15}{20.9 - C_{O2}}$$

where,

C_{CO}	--	= CO concentration, ppmvd
C_{O2}	--	= O_2 concentration, %
C_{COc15}	--	= ppmvd @ 15% O_2

Alliance SOURCE TESTING

Location: -
Source: --
Project No.: --
Run No./Method Run 1 Outlet/ Method 10

Carbon Monoxide Concentration (C_{CO}), ppmvd

$$C_{CO} = (C_{obs} - C_o) \times \left(\frac{C_{MA}}{(C_M - C_o)} \right)$$

where,

C_{obs}	--	= average analyzer value during test, ppmvd
C_o	--	= average of pretest & posttest zero responses, ppmvd
C_{MA}	--	= actual concentration of calibration gas, ppmvd
C_M	--	= average of pretest & posttest calibration responses, ppmvd
C_{CO}	--	= CO concentration, ppmvd

Carbon Monoxide Concentration @ 15% Oxygen (C_{COc15}), ppmvd @ 15% O2

$$C_{COc\,15} = C_{CO} \times \frac{20.9 - 15}{20.9 - C_{O2}}$$

where,

C_{CO}	--	= CO concentration, ppmvd
C_{O2}	--	= O_2 concentration, %
C_{COc15}	--	= ppmvd @ 15% O_2

Carbon Monoxide Reduction Efficiency (RE_{CO}), %

$$RE_{CO} = \left(\frac{C_{COc\,15I} - C_{COc\,15}}{C_{COc\,15I}} \right) \times 100$$

where,

C_{COc15I}	--	= CO Inlet Concentration (corrected), ppmvd @ 15% O_2
C_{COc15}	--	= CO Outlet Concentration (corrected), ppmvd @ 15% O_2
RE	--	= %

Appendix C

SUNOCO PARTNERS
MARKETING & TERMINALS
An ENERGY TRANSFER Partnership

Via First Class & Electronic Mail

December 17, 2020

Erin Willard
Environmental Scientist
US EPA Region III
Office of Air Enforcement and Compliance Assistance (3AP20)
1650 Arch Street
Philadelphia, PA 19103

Re: Sunoco Partners Marketing & Terminals L.P. – Marcus Hook Industrial Complex
Title V Operating Permit 23-00119
Request for an Alternate Testing Plan for 40 CFR Part 63, Subpart ZZZZ

Dear Ms. Willard,

Sunoco Partners Marketing & Terminals L.P. (SPMT) has six (6) diesel engines located at its Marcus Hook Industrial Complex and subject to 40 CFR Part 63, Subpart ZZZZ. Those six diesel engines power six water pumps that are used only when a significant rain event occurs in the facility. The pumps were installed in 1994. As they were subject to Subpart ZZZZ as existing engines located at a major facility and were greater than 500 HP, controls were installed under Pennsylvania Plan Approval 23-0001AD and later incorporated into Tile V Operating Permit 23-00119. The Subpart ZZZZ regulation has specific requirements for notification and testing at full load that are not reasonably achievable due to uncertainty of rainwater. In order to achieve the load conditions required of the regulation, a significant rainfall must occur. Also, the equipment cannot normally run fully loaded for the length of time to do full testing (three, 1-hour runs typically require 4 hours per source). As the amount of water subsides in the facility, the pumps are shutdown as they cannot operate without water.

Below is a summary of the diesel engine pump sets:

Description	Horsepower of Diesel	Standard Capacity
MP05-02 A & B	1745	23,500 GPM
MP05-04 A&B	2294	32,000 GPM
MP05-06 A & B	1184	42,650 GPM

SPMT previously requested alternate testing plans in letters to the EPA dated July 8, 2013 and January 22, 2018. The EPA approved of the alternate testing plans in letters to SPMT dated August 1, 2013 and February 20, 2018. SPMT completed the initial performance testing of engines 2A, 4B, and 6A on September 30, 2015; completed the testing on engines 2B and 6B on November 16, 2018; and completed the testing on engine 4A on December 20, 2018.

Engines 2A, 4B, and 6A are due to be retested in 2021; however, SPMT is proposing to test all six engines in 2021 to reestablish the operating limitations for the pressure drop across the catalyst on all the engines. SPMT kindly requests an alternative testing plan to demonstrate compliance with

the 23 ppm of CO at 15% O2 (40 CFR 63 ZZZZ Table 2C). SPMT intends to monitor the forecast for significant rain, mobilize our testing contractors, and stage testing equipment near the pumps in preparation for the test.

- Testing of CO in 15 minute runs verses the three 1-hour runs (1-hour run requirement is found in Table 4 item #5 of the standard. Per 40 CFR 63.6630, 15-minute requirement allowed for other equipment).
- 60-day notification of intent to test requirement waived (63.6645(g)).
- Waiver of stratification requirement Method 1 (this was granted for internal combustion engine test for Reference Method 7E). See attached.
- Compliance standard of 23 ppm CO at 15% excess O2 is the applicable standard.

Submittal of testing protocols and final test reports to the appropriate agencies will be compliant with the State and Federal rules.

Please feel free to contact me by email at kevin.smith2@energytransfer.com or by telephone at 610-859-1279.

Sincerely,

Kevin Smith

Kevin Smith
Specialist – Environmental Compliance

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JUL 27 2011

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Ryan O'Dea
Alliance Source Testing
8020 Counts Massie Road
N. Little Rock, Arkansas 72113

Dear Mr. O'Dea:

In your July 21, 2011 correspondence, you asked for a waiver of the stratification test required in Method 7E (40 CFR 60, Appendix A) when testing reciprocating internal combustion engines. You noted the difficulty in evaluating emission profiles where gas concentrations are constantly varying and exhausts are too small to effectively traverse. These conditions render a stratification test ineffective and inappropriate. Under Federal New Source Performance Standards (40 CFR 60 Subparts IIII and JJJJ), Methods 1 or 1A and Method 7E are required for selecting sampling points and measuring nitrogen oxides (NO_x). Method 7E requires a stratification check before each test.

We agree that a stratification test does not enhance representative sampling and is not appropriate under the noted conditions. We are currently revising Subparts IIII and JJJJ to delete the Method 1 or 1A requirement for sampling point selection. In its place we will specify single-point sampling at the centroid of the exhaust. This new requirement will preclude the need for a stratification test with Method 7E.

We grant your request for a waiver of the stratification test whenever Method 7E is used to determine NO_x emissions from Federally-regulated engines. Single-point sampling at the centroid of the exhaust is adequate. This waiver also applies to carbon monoxide testing. We will be posting this approval on our website at http://www.epa.gov/ttn/emc/approalt.html for use by other interested parties with similar situations.

If you have questions or would like to discuss the matter further, please call Foston Curtis at (919) 541-1063 or you may email him at curtis.foston@epa.gov.

Sincerely,

Conniesue B. Oldham, Ph.D., Group Leader
Measurements Technology Group

cc: Melanie King, OAQPS/SPPD/ESD (D243-01)

Last Page of Report